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Secretary for Environmental Protection

Department of Pesticide Regulation

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Gray Davis
Governor

MEMORANDUM

TO: Gary M. Carlton, Executive Officer
California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road
Sacramento, California 95827-3098

FROM: Paul E. Helliker Paul Helliker
Director
(916) 445-4000

DATE: January 21, 2000

SUBJECT: RICE PESTICIDES PROGRAM 1999 UPDATE

On January 23, 1998, the Central Valley Regional Water Quality Control Board (CVRWQCB) adopted Resolution No. 98-024 in which it approved of the Department of Pesticide Regulation's (DPR's) rice pesticide management practices for the 1998 through 2000 rice growing seasons. The attached report provides a summary of DPR's 1999 rice pesticide monitoring results and the rice growing season.

DPR's Rice Pesticides Program is an effort to protect water quality in receiving waters adjacent to rice fields, including agricultural drains and the Sacramento River. DPR enforces specific management practices designed to meet water quality performance goals aimed at protecting receiving waters from toxicity of rice pesticides. These water quality performance goals were established by CVRWQCB and are contained in the Sacramento Valley Basin Plan.

The most significant features of the 1999 rice pesticide application season were:

- Rice acreages, based on the most current estimate, increased 14 percent from 478,000 acres harvested in 1998 to 548,000 acres harvested.

- Cool weather conditions slowed rice plant and weed maturity, making early season pesticide application challenging for growers. Weed pressure was high especially with sprangletop and ever-increasing herbicide resistant watergrass.

- There were only four emergency releases granted in 1999--three due to salinity in Colusa County for Bolero®, and one emergency release for Ordram® in Glenn County due to cultural conditions.

- County agricultural commissioner offices made 2,793 inspections to check compliance with water-holding requirements. There were 507 pesticide application inspections and 263 mix/load inspections made. There were 37 non-compliance and 15 agricultural civil penalties issued.

- The Colusa Basin Drain (CBD5), Butte Slough (BS1), and the Sacramento River at the Village Marina (SR1) were monitored for the rice pesticides molinate, thiobencarb, carbofuran, methyl parathion, and malathion from April 27 through June 24. Toxicity tests using *Ceriodaphnia dubia* were performed once per week from April 27 through June 8.

- Performance goals were exceeded for molinate, thiobencarb, carbofuran and malathion at CBD5. Malathion exceeded the performance goal once at CBD5. Thiobencarb and carbofuran exceeded the performance goal one time each at BS1. There were no performance goal violations at SR1 for rice pesticides in 1999.

- There were seven detections of molinate and five detections of thiobencarb at the City of Sacramento drinking water intake. The levels of thiobencarb detected were below the human health maximum contaminant level of 10.0 parts per billion (ppb) or the secondary action level of 1.0 ppb for off-taste set by the State of California Department of Health Services. There were no taste complaints reported to the City of Sacramento from municipal water users in 1999.

- Toxicity occurred at CBD5 on May 11 and May 25. Toxicity on May 11 was attributed to the presence of carbofuran detected at 3.6 ppb. The toxicity on May 25 remains inconclusive as the rice pesticides sampled for were found at amounts that would not result in toxicity. At DPR's request, further pesticide analysis was conducted on field samples for organophosphates, carbamates, and bifenthrin. Only carbofuran was detected at 0.25 ppb, below the primary laboratory's quantitation limit and below the carbofuran LC_{50} for *C. dubia.*

- In 1999, usage of carbofuran's pesticide alternatives, lambda cyhalothrin and diflubenzuron, began. Although a federal registration was approved, DPR denied registration of fipronil, another carbofuran alternative for use on rice in California, due to aquatic toxicity concerns. Carbofuran remained available for rice growers in 1999 while growers phased in the use of these alternatives. DPR required rice growers to report the total acres treated with lambda cyhalothrin and diflubenzuron. With the elimination of carbofuran, it is anticipated that valley-wide use of these new pesticides will occur sometime in the future.

- Phenoxy herbicide use was limited to existing stocks due to the voluntary removal of their use on rice by the pesticide registrants.

My staff and I look forward to another year of cooperation with CVRWQCB implementing a successful Rice Pesticide Program. If you have any questions, please contact me, or your staff may contact KayLynn Newhart, of my staff, at (916) 324-4190.

Attachment

Information on Rice Pesticides Submitted to the California Regional Water Quality Control Board Central Valley Region

December 31, 1999

by

KayLynn Newhart and Kevin Bennett

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Department of Pesticide Regulation
Environmental Monitoring and Pest Management Branch
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Department of Pesticide Regulation
Information on Rice Pesticides
Submitted to the Central Valley Regional Water Quality Control Board
December 31, 1999

The Department of Pesticide Regulation (DPR) implemented the Rice Pesticides Program in 1983 to reduce discharges of the rice herbicides molinate (Ordram®) and thiobencarb (Bolero® and Abolish®) into surface waterways. In 1990, the objectives of these control efforts were expanded, following the adoption of amendments to the Central Valley Regional Water Quality Control Board's (CVRWQCB) Water Quality Control Plan (Basin Plan). This plan established performance goals for molinate and thiobencarb beginning in 1990, and for the insecticides carbofuran (Furadan®), methyl parathion, and malathion beginning in 1991.

The following summary describes the factors affecting the presence of molinate, thiobencarb, carbofuran, methyl parathion, and malathion in agricultural drains and the Sacramento River and DPR's efforts to meet the performance goals in 1999. A summary of water quality monitoring results is provided.

REVIEW OF 1999 RICE PESTICIDES PROGRAM

County agricultural commissioners (CACs), with the use of restricted materials permits, implemented program requirements for molinate, thiobencarb, carbofuran, and methyl parathion in 1999. A description of the 1999 rice pesticide program requirements can be found in the guidelines provided to the CACs by the Director of DPR in a memorandum dated March 8, 1995 (see Appendix A). Permit conditions defined in 1995 were determined adequate for use in 1999 and remained unchanged. DPR and CACs continued encouraging voluntary control efforts by growers for malathion use, improved communication about the contributing factors to seepage beyond field levies, and enforcement of drift control measures to control off-target movement of rice pesticides.

Molinate and Thiobencarb

The standard molinate holding period remained 28 days (Appendix A, attachment 1) and the standard Bolero® holding period remained 30 days in the Sacramento Valley. Abolish® has a shorter holding period of 19 days (Appendix A, attachment 2). Shorter holding periods were available for molinate and thiobencarb users in water-short areas, users utilizing closed water management systems, users with hydrologically isolated fields throughout the rice-growing region, and growers in the San Joaquin Valley.

Carbofuran, Methyl parathion, and Malathion

Control efforts for the rice insecticides remained unchanged with the required holding periods of 28 days for carbofuran-treated fields (Appendix A, attachment 3) and 24-day holds for methyl parathion-treated fields (Appendix A, attachment 4). Shorter holding periods are allowed for growers utilizing closed water management systems. Malathion is not a restricted material and mandatory holds are not enforced. Malathion users, under a voluntary effort, are encouraged to hold malathion-treated water for four days (Appendix A, attachment 5).

Seepage Control

Seepage is the lateral movement of irrigation water through a rice field levee or border adjacent to flooded rice fields. In 1995 the CAC's began providing voluntary seepage measures in a handout to rice growers at permit issuance (see Appendix B). The single page handout entitled *Closed Rice Water Management Systems*, was prepared by DPR, numerous interested parties representing the rice industry, the University of California Cooperative Extension, and the United States Department of Agriculture. In 1998, a cooperative effort between DPR and the University of California Cooperative Extension, Davis created an additional publication supplied to CACs for growers entitled Seepage Water Management, Voluntary Guidelines for Good Stewardship in Rice Production, University of California Division of Agriculture and Natural Resources Publications 21568 (Appendix D). Both documents supply growers with detailed information on identifying cultivation practices that contribute, and control measures that can be taken to prevent seepage.

Summary of Rice Growing Conditions in 1999

Pesticide use in rice growing is impacted by many conditions including weather, weed pressures, and total acres in production. In 1999 cool conditions prevailed throughout the growing season delaying maturity of both rice and unwanted weeds. Timing of weed control was challenging for growers and weed pressures were high especially with sprangletop and herbicide resistant watergrass. In 1998 rice acreage harvested was estimated at 478,000. Estimated rice acreage increased to 548,000 acres harvested in 1999.

Rice Pesticide Use in 1999

In rice-growing counties of the Sacramento Valley, CACs keep records of the acreage treated with rice pesticides. Notices-of-Application (NOAs) for rice pesticides are submitted by the grower to each CAC office. Rice pesticide use summarized in this report include; molinate, thiobencarb, carbofuran, methyl parathion, lambda cyhalothrin, triclopyr, propanil, and diflubenzuron (Table 1 and 2).

Enforcement Activities

The CACs are responsible for enforcement of the rice pesticide program. CAC staff explains the rice pesticide program to growers, pest control advisors and operators; issues restricted material permits; conducts pesticide mixing, loading, application and water holding inspections; evaluates emergency release variances; and reports rice pesticide use to DPR.

Before a pesticide on the list of California restricted materials may be applied, growers must obtain a permit from their CAC. The permits may specify conditions for use of the pesticide, including post-application water-holding requirements. A Notice-of-Intent must be filed by the grower, with the CAC 24 hours prior to the application, providing the CACs with the option to observe the mixing, loading, and application of the material, allowing enforcement of regulations that pertain to pest control operations. Permits, which specify post-application water-holding requirements like those for the use of molinate, thiobencarb, carbofuran, and methyl parathion require the NOA be filed with the CAC within 24 hours after the application. NOA's are used to determine when water holding periods begin.

In 1998 DPR and the CACs implemented a Prioritization Plan and a Negotiated Workplan. Part of the plan included a negotiated number of water hold inspections. These plans allow the counties to set priorities within standard guidelines. Rice pesticide applications and water-hold inspections are ranked as "High Priority" inspections due to their restricted material and special study status. The CACs receive partial reimbursement from DPR based on the numbers of inspections completed.

CACs staff inspected 2,793 rice fields for compliance with water-holding requirements. Additionally, there were 263 inspections of the pesticide mixing and loading process with 17 non-compliances observed and 507 inspections of pesticide applications . A total of 15 violations were serious enough to warrant agricultural civil penalty actions (ACP). Ten ACPs were due to water-holding violations and four ACPs were issued for application errors.

Emergency releases are generally limited to fields where an 11-day molinate hold has elapsed and circumstances are beyond a conscientious growers' control. Growers granted such variances are instructed to drain water only to the extent necessary to restore a healthy growing environment for the rice seedlings. Emergency release documentation is

submitted to CAC detailing affected acreage, pesticides applied, time, amount and duration of water released (Appendix A, attachment 6 and 7). In 1999 a record low of only four emergency releases were granted. In Colusa County three emergency releases were granted for salinity. The water released from one of those releases never left the grower's control. In Glenn County one emergency release was granted for cultural conditions. Two inquiries in Butte County and one inquiry in San Joquin County were made but resulted in no releases.

Beginning in 1994, repeat and multiple violators were required, as part of permit conditions, to make improvements in their water management practices. Such improvements may include installation of pumps for tailwater recirculation or containing spillage on fallow land. Growers who violate water holding requirements are subject to maximum penalties within DPR's Enforcement Guidelines. However, environmental conditions preceding violations (e.g., unfavorable field conditions that could not be moderated by the growers' best efforts) may be considered when assessing penalties.

DESCRIPTION OF 1999 COOPERATIVE WATER QUALITY MONITORING

The Rice Research Board retained the consulting firm Kleinfelder, Inc., to collect water monitoring samples from the Colusa Basin Drain at Highway 20 (CBD5) in Colusa County, Butte Slough at Lower Pass Road in Sutter County (BS1), and the Sacramento River at the Village Marina (SR1) (Figure 1). DPR staff prepared the lab plan, monitoring protocol and sample schedule (Appendix C).

Sampling and Analytical Regimen

In 1999 DPR staff plotted all sample data from 1990-1999 for molinate, thiobencarb, carbofuran, methyl parathion, and malathion. This data confirmed that each chemical had a unique time period during the ten-week rice study when it was most likely to be present near or exceeding the performance goal. To optimize use of resources, DPR staff determined to refine the sample schedule to eliminate sampling resulting in early and late season non-detections, a pattern occurring in previous years with the sampling regime. Accounting for the late start to the application season, this modification was further justified in 1999, and did not negatively impact sampling data collected. The sampling schedule details the numbers of samples collected, pesticides sampled, and the sampling site. DPR staff chose to continue sampling twice weekly, on Tuesdays and Thursdays at the CBD5 site and collect toxicity samples on every Tuesday for the middle eight weeks of the study. The sampling sites located at BS1 and SR1 were reduced to sample collection once instead of twice weekly with no toxicity sampling occurring at these sites. Overall, there was a reduction of 22 primary samples and 10 Quality Control (QC) samples from the 1998 program. Despite this reduction, the study design maintained a QC sample rate of 10%, in accordance with DPR's standard operating procedure.

The following laboratories and the analysis they performed are: Zeneca Ag Products, manufacturer of Ordram® for molinate; Valent USA, primary distributor of Bolero® and Abolish® for thiobencarb; FMC Corporation, manufacturer of Furadan® for carbofuran;

California Department of Food and Agriculture for methyl parathion and malathion. Additional samples representing 10% of the total samples were analyzed as quality control samples. The California Department of Food and Agriculture (CDFA) laboratory performed QC analysis for molinate and thiobencarb. The State of California Department of Fish and Game (DFG) performed QC analyses for carbofuran, methyl parathion and malathion. Additional back-up samples were collected and stored in case sample bottles were accidentally broken or if analytical confirmation of results was desired. Blind spikes and rinse blanks were periodically submitted for analysis with field samples. The City of Sacramento Water Quality Laboratory conducted independent analysis for molinate and thiobencarb concentrations in water samples collected weekly from the Sacramento River at the intake to its water treatment plant from May 17 through June 21.

Water samples for performing toxicity tests were collected weekly for eight weeks from the Colusa Basin Drain at CBD5 beginning April 27 through June 8. Department of Fish and Game staff exposed neonate (<24 hour old) cladocerans (*Ceriodaphnia dubia*) to sample water for 96 hours and to control and blind spiked water samples. Percent survival was recorded and reported to DPR.

MONITORING TEST RESULTS

The peak thiobencarb concentration in 1999 was 10.9 parts per billion (ppb) on June 8 at CBD5 (Table 3). The performance goal for thiobencarb (1.5 ppb) was exceeded on all sampling dates from May 13 through June 24 at CBD5 (Figure 2 and 3). The concentration data was very similar to 1998 when the peak reached 11.0 ppb and the performance goal was exceeded on all sample dates from May 26 through July 9.

There were five detections of thiobencarb at the City of Sacramento drinking water intake. For the time period observed, thiobencarb concentrations in the Sacramento River in 1999 did not meet or exceed the human health maximum contaminant level for drinking water of 10 ppb or the secondary action level of 1.0 ppb set by the State of California Department of Health Services. The detections occurred between May 24 and June 14 (Table 6), peaking at 0.34 ppb on June 4. There were four thiobencarb detections at BS1, with one detection at 4.1 ppb on June 8 exceeding the performance goal (Table 4). There was only one detection of thiobencarb at SR1 of 0.50 ppb o June 8 (Table 5).

In 1999 the peak molinate concentration was 19.6 ppb on June 8 at CBD5 (Figure 4 and 5). The performance goal for molinate (10.0 ppb) was exceeded seven times from May 20 through June 22 (Table 3). Molinate concentrations were much lower in 1999 than in 1998 when the peak concentration was 44.09 ppb and stayed high for a three-week period. There were seven detections of molinate at the City of Sacramento drinking water intake on all sample dates between May 24 and June 21. The concentration peaked at 1.3 ppb on May 24. There were no molinate concentrations above the performance goal at BS1, SR1, or SRRAW in 1999 (Tables 3,4, and 5).

Carbofuran was detected four times at CBD5 from May 4 through May 18. All of the detections were above the performance goal of 0.4 ppb. The peak detection was 3.6 ppb and occurred on May 11 (Figure 6). Carbofuran was detected once at BS1 on May 18 at 0.77 ppb and was not detected in any samples at SR1. The sample collected from CBD5 for toxicity analysis on May 11 caused 95% mortality of *C. dubia*. This result was expected, as the LC_{50} for *C. dubia* is 2.4 ppb. No other toxicity was attributable to carbofuran in 1999.

Methyl parathion was not detected at CBD5 or SR1 in 1999. There was one detection of methyl parathion at BS1 on May 25 at .051 ppb (Table 4). The performance goal for methyl parathion is 0.13 ppb and was not exceeded.

Malathion was detected at CBD5 at a concentration of 0.057 ppb on May 18. The performance goal (0.1 ppb) was exceeded on May 20 at BS1 when the concentration was 0.289 ppb. There was one detection of malathion at 0.067 ppb on June 8 at BS1. There were no detections of malathion at SR1 in 1999.

There was a second occurrence of toxicity on May 25 with 85% mortality of *C. dubia*. Molinate was detected at 11.9 ppb and thiobencarb was detected at 10.0 ppb, below individual levels of toxic concern for *C. dubia*. At DPR's request CDFA laboratory performed further analysis on field samples for organophosphates, carbamates, and bifenthrin. All other chemical analysis resulted in non-detections except for carbofuran, which was found at 0.25 ppb; below the primary labs quanitation limit and well below the LC_{50} for *C. dubia*.

Although residue concentrations and applications of thiobencarb, carbofuran and molinate closely reflect one another, concentrations appear too early to be explained by field run-off due to the legal water release time period having been met. Aerial drift and seepage are the most likely sources causing pesticide concentrations early in the application season, and later when secondary peaks are present.

1999 RICE PESTICIDE ISSUES

- Herbicide resistance continues to increase within two of the most problematic groups of weeds in rice culture, watergrass and sedge. These weeds exhibit resistance to herbicides with the same mode of action, even if they have not been exposed to a particular herbicide before. Herbicides that control with different modes of action have been used, but still do not control all of the weed species that are resistant. Scientific advancements in genetic science have resulted in rice plants bred with genes resistant to glyphosate and gluphosinate herbicides. These products can be applied to actively growing rice, non-selectively killing weeds without harming rice plants. Growers are looking to incorporate rotation of glyphosate and gluphosinate herbicides to break the cycle of weed resistance.

- Thiobencarb use has increased due to weed resistance problems and lack of alternative herbicides (Table 7). Although the peak levels of thiobencarb are lower than levels prior to 1995 (Table 8), from 1994-1999 thiobencarb detections in the Colusa Basin Drain exhibit an upward trend in quantity, duration, and in the number of times the performance goal were exceeded (Table 9). Monitoring data results from 1994-1999 have resulted in a consistent mid to late season time period where levels of thiobencarb were above the performance goal. The increase in thiobencarb use is attributed to a lack of alternative herbicides, rice herbicide resistance to Londax® (bensulfuron methyl), and a rise of acreage in rice production (Figure 7 and 8). Staff at DPR are completing an analysis of the increase and the incidence of concentrations occurring at the monitoring sites. This analysis will be available in 2000.

- Monitoring was not conducted in 1999 for propanil, triclopyr or the phenoxy herbicides 2,4-D and MCPA. Registration of the phenoxy compounds for use on rice was removed by the registrants. Propanil and triclopyr were not found in the 1998 monitoring study at levels that suggested further evaluation in 1999. DPR continues to evaluate potential effects of new products being registered for use on rice.

- The United States Environmental Protection Agency granted a one-year extension to rice growers in California for the use of carbofuran in 1999. Carbofuran is not expected to be available for use in 2000. Two alternatives to carbofuran, diflubenzuron (Dimilin®) and lambda cyhalothrin (Warrior®/Karate®) were used in 1999. Fipronil another potential alternative was denied registration by DPR for use on rice in California due to aquatic toxicity and environmental fate concerns even though a federal registration was approved. DPR will investigate the need to monitor the new carbofuran alternatives for 2000.

- Carfentrazone-ethyl (Shark®), a new herbicide registered for use in 1999 caused significant damage to off-target orchard crops adjacent to early applications. Use of Shark was immediately halted pending investigation by DPR's Pesticide Enforcement Branch.

RICE PESTICIDES PROGRAM IN 2000

The 2000 rice pesticide program will remain as described for the 1999 program. DPR plans to continue to work with DFG, CVRWQCB, pesticide registrants, rice growers, rice industry representatives, rice research and education organizations to address issues related to pesticide use and water quality.

Pesticide Monitoring 2000

- The monitoring program for molinate, thiobencarb, methyl parathion, and malathion will remain the same in 2000 as it was in 1999. Carbofuran monitoring will continue if USEPA grants an extension to the use of the product for 2000 .

- The need for monitoring for new pesticides is being addressed and will be added to the monitoring plan based on aquatic toxicity and environmental fate concerns.

- DPR will continue to document and ensure provisions of emergency releases, their causes, and environmental impacts to receiving waters, are being addressed.

- DPR's Pesticide Enforcement Branch and CAC offices will continue to place a priority on compliance of rice pesticide use permit conditions.

- DPR continues to work on the development of generic pesticide drift regulations. The draft of these regulations will be forwarded to the State Water Resources Control Board and Central Valley Regional Water Quality Control Board in accordance with the Management Agency Agreement between DPR and these agencies when the regulations are prepared.

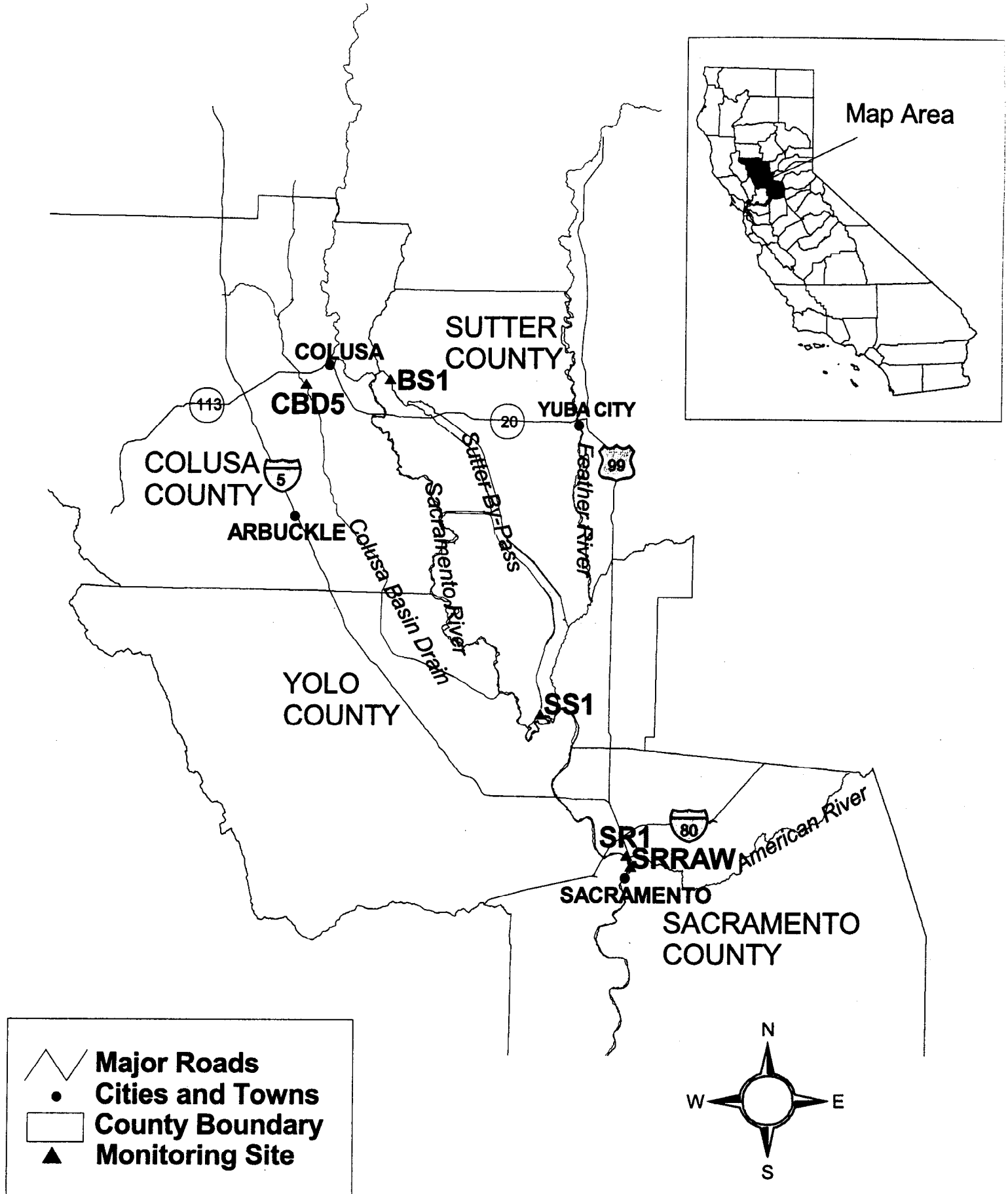
- DPR will present the triennial review, as agreed upon between DPR and the CVRWQCB, explaining the 2002-2004 Rice Pesticides Program. This review will be submitted with the results of the 2000 rice pesticide use summary due by December 31, 2000.

Rice Pesticide Program Monitoring Sites in the Sacramento Valley

(Map of sites on following page.)

CBD5	Colusa Basin Drain near Highway 20 in Colusa County
CBD1	Colusa Basin Drain at Roads 109 and 99E near Knight's Landing in Yolo County, near its outfall on the Sacramento River.
BS1	Butte Slough near Highway 20 in Sutter County
SS1	Sacramento Slough at the Department of Water Resources gauge station in Sutter County, near its outfall on the Sacramento River.
SR1	Sacramento River approximately 1.5 km upstream from the confluence with the American River, at the Village Marina in Sacramento County.
SRRAW	Sacramento River at the intake to the water treatment facility in Sacramento, approximately 0.3 km downstream from the confluence with the American River, in Sacramento County.

Figure 1. Pesticide monitoring sites in the Sacramento Valley



DRAFT DATA- SUBJECT TO CHANGE

Table 1. Acres treated with molinate (Ordram®), thiobencarb (Bolero® and Abolish®), carbofuran (Furadan®), and methyl parathion based on Notices-of-Application in the rice growing counties of the Sacramento Valley in 1999.

	Acres Treated			
County	Molinate	Thiobencarb	Carbofuran	Methyl parathion
Butte	58,824	38,224	24,858	497
Colusa	44,402	85,191	10,011	0
Glenn	47,971	25,516	3,997	0
Placer	10,715	2,030	3,631	0
Sacramento	4,593	5,931	503	0
Sutter	9,768	32,724	9,167	2,233
Tehama	0	69	0	0
Yolo	9,629	11,878	30	0
Yuba	20,075	8,121	4,756	624
Total	**205,977**	**209,864**	**56,953**	**3,354**

Table 2. Acres treated with Lambda cyhalothrin (Warrior®/Karate®), Triclopyr (Grandstand®), Propanil (Propanil-4®, Wham E-Z®, Super Wham®), Diflubenzuron (Dimilin®) based on seasonal summaries reported to DPR from CAC offices of the rice growing counties of the Sacramento Valley in 1999.

	Acres Treated			
County	Lambda cyhalothrin	Triclopyr	Propanil	Diflubenzuron
Butte	6,999	38,333	32,614	2,718
Colusa	6,896	74,533	57,235	1,553
Glenn	10,680	40,150	43,358	365
Placer	1,313	1,529	6,661	0
Sacramento	135	6,087	7,512	44
Sutter	5,580	29,029	30,407	0
Tehama	0	0	0	0
Yolo	132	11,043	11,476	0
Yuba	2,715	2,977	3,294	0
Total	**27,017**	**34,450**	**192,557**	**4,680**

PRELIMINARY DATA/SUBJECT TO CHANGE

Table 3. 1999 Pesticide Concentrations at the Colusa Basin Drain near Highway 20 in Colusa County (CBD5) in parts per billion (ppb).

	Molinate		Thiobencarb		Carbofuran		Methyl parathion	Malathion
Laboratory type	Primary	QC	Primary	QC	Primary	QC	Primary	Primary
Reporting limit (ug/L)	1.0	0.5	0.5	0.5	0.35	0.20	0.05	0.05
Date								
4/13	ND	ND	ND	ND	ND	ND	ND	ND
4/27	NS	NS	NS	NS	ND	NA	ND	ND
4/29	NS	NS	NS	NS	ND	NA	ND	ND
5/4	NS	NS	NS	NS	0.65	NA	ND	ND
5/6	NS	NS	NS	NS	ND	NA	ND	ND
5/11	NS	NS	0.7	NA	3.6	NA	ND	ND
5/13	NS	NS	1.6	NA	0.63	NA	ND	ND
5/18	9.2	NA	4.2	NA	0.78	NA	ND	0.057
5/20	11.2	NA	3.7	NA	ND	NA	ND	0.289
5/25	11.9	NA	10.0	NA	ND	NA	ND	ND

Samples collected by Kleinfelder, Inc. under contract with the California Rice Research Board.
Key to designations on rice water monitoring table for CBD5 are shown at the end of the following page

PRELIMINARY DATA/SUBJECT TO CHANGE

Table 3 con't.,1999 Pesticide Concentrations at the Colusa Basin Drain near Highway 20 in Colusa County (CBD5) in parts per billion (ppb)

	Molinate		Thiobencarb		Carbofuran		Methyl parathion	Malathion
Laboratory type	Primary	QC	Primary	QC	Primary	QC	Primary	Primary
Reporting limit (ug/L)	1.0	0.5	0.5	0.5	0.35	0.20	0.05	0.05
Date								
5/27	18.6	18.4	10.9	12.7	ND	NA	ND	ND
6/1	ND	NA	6.3	NA	ND	NA	ND	ND
6/3	12.4	NA	4.8	NA	ND	NA	ND	ND
6/8	19.6	NA	10.9	NA	ND	NA	ND	ND
6/10	9.6	NA	3.5	NA	ND	NA	ND	ND
6/15	10.3	NA	2.0	5.0	ND	NA	ND	ND
6/17	7.8	NA	2.1	NA	ND	NA	ND	ND
6/22	10.3	NA	2.3	NA	ND	NA	NA	NA
6/24	7.8	NA	2.1	NA	ND	NA	NA	NA

Samples collected by Kleinfelder, Inc. under contract with the California Rice Research Board.

Key to designations on rice water monitoring table for CBD5:

QC	Quality control
Blank cells	Results not yet reported
ND	Not detected
NS	Not sampled
NA	Not analyzed

PERFORMANCE GOALS (ppb):

molinate	10	methyl parathion	0.13
thiobencarb	1.5	malathion	0.1
		carbofuran	0.4

PRELIMINARY DATA/SUBJECT TO CHANGE

Table 4. 1999 Pesticide Concentrations at Butte Slough at Lower Pass Road in Sutter County in parts per billion (ppb).

	Molinate	Thiobencarb	Carbofuran	Methyl parathion	Malathion
Laboratory type	Primary	Primary	Primary	Primary	Primary
Reporting limit (ug/L)	1.0	0.5	0.35	0.05	0.05
Date					
4/13	ND	ND	ND	ND	ND
4/27	NS	NS	ND	ND	ND
5/4	NS	NS	ND	ND	ND
5/11	NS	ND	ND	ND	ND
5/18	4.0	ND	0.77	ND	ND
5/25	5.0	0.6	ND	0.051	ND
6/1	9.0	1.1	ND	ND	ND
6/8	6.8	4.1	ND	ND	0.067
6/15	5.0	0.7	ND	ND	ND
6/22	ND	ND	ND	NA	NA

Samples collected by Kleinfelder, Inc. under contract with the California Rice Research Board.
Refer to key for Butte Slough (BS1) designations listed at the end of data table for Sacramento River at Village Marina (SR1)

PRELIMINARY DATA/SUBJECT TO CHANGE

Table 5.1999 Pesticide Concentrations in the Sacramento River at the Village Marina in Sacramento County in parts per billion (ppb).

	Molinate	Thiobencarb	Carbofuran	Methyl parathion	Malathion
Laboratory type	Primary	Primary	Primary	Primary	Primary
Reporting limit (ug/L)	1.0	0.5	0.35	0.05	0.05
Date					
4/13	ND	ND	ND	ND	ND
4/27	NS	NS	ND	ND	ND
5/4	NS	NS	ND	ND	ND
5/11	NS	ND	ND	ND	ND
5/18	ND	ND	ND	ND	ND
5/25	1.2	ND	ND	ND	ND
6/1	2.0	ND	ND	ND	ND
6/8	1.4	.50	ND	ND	ND
6/15	ND	ND	ND	ND	ND
6/22	NS	ND	ND	NS	NS
6/24	NS	NS	ND	NS	NS

Samples collected by Kleinfelder, Inc. under contract with the California Rice Research Board.

Key to designations on rice water monitoring table for Butte Slough (BS1) the Sacramento River at the Village Marina (SR1):

Blank cells	Results not yet reported
ND	Not detected
NS	Not sampled
NA	Not analyzed

PERFORMANCE GOALS (ppb):

molinate	10	methyl parathion	0.13
thiobencarb	1.5	malathion	0.1
		carbofuran	0.4

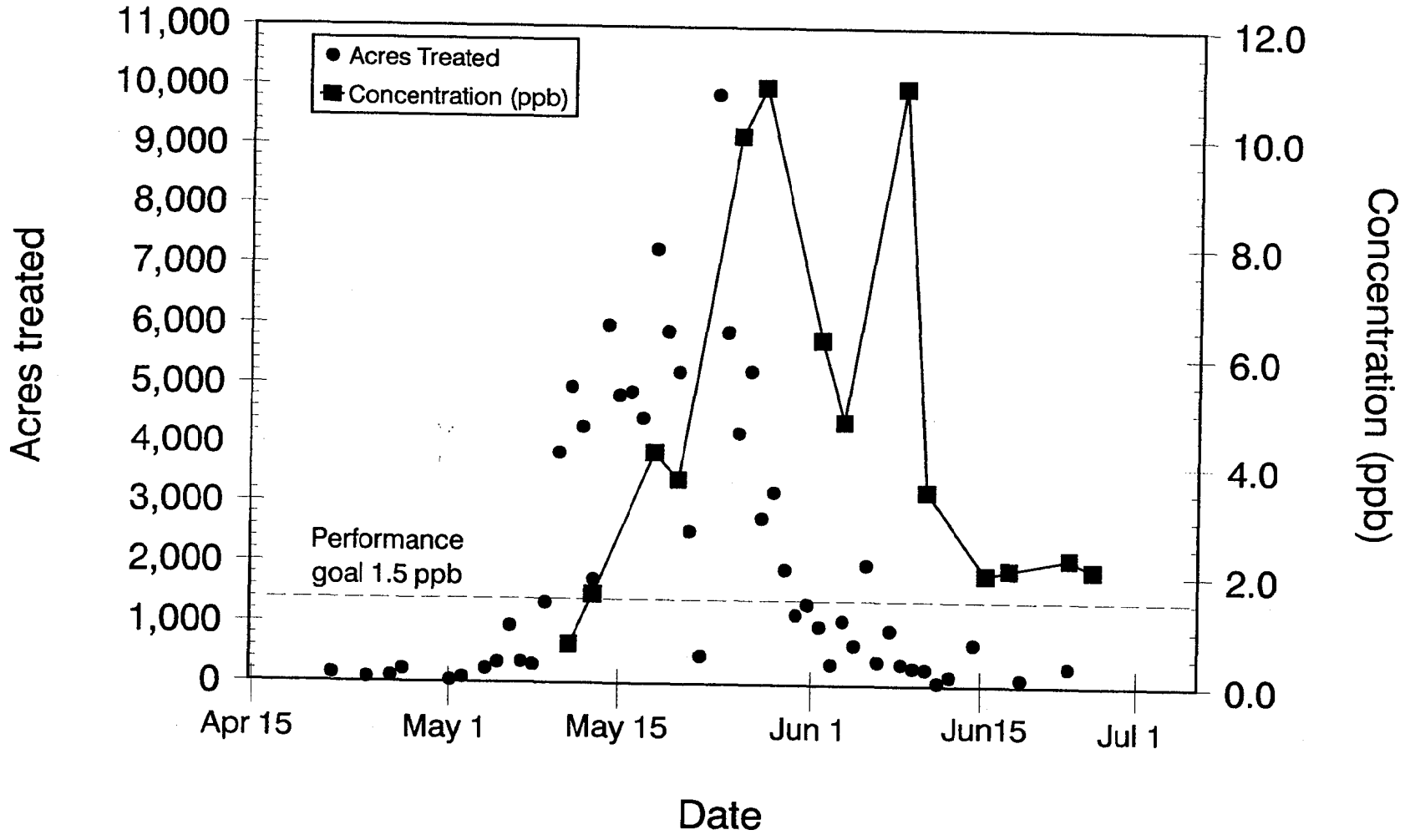
PRELIMINARY DATA/SUBJECT TO CHANGE

Table 6. 1999 rice herbicide monitoring results for molinate and thiobencarb reported by the City of Sacramento Division of Water, Water Quality Laboratory taken at the Sacramento River WTP Intake (SRR). Results in ug/L, (ppb).

Date	MOLINATE	THIOBENCARB	%SACRAMENTO RIVER AT INTAKE
5/17	<0.10	<0.10	65.2
5/24	1.3	0.25	71.4
5/27	0.46	<0.10	76.9
5/31	1.1	0.30	76.5
6/4	0.79	0.34	66.0
6/8	0.68	0.33	71.8
6/14	0.56	0.29	76.2
6/21	0.22	<0.10	76

Preliminary Data
Subject to Change

Figure 2. Acres treated with thiobencarb in Colusa and Glenn Counties and concentrations of thiobencarb in the Colusa Basin Drain near SR20 in 1999.



Preliminary Data
Subject to Change

Figure 3. Acres treated with thiobencarb in Butte County and concentrations of thiobencarb in Butte Slough near SR20 in 1999.

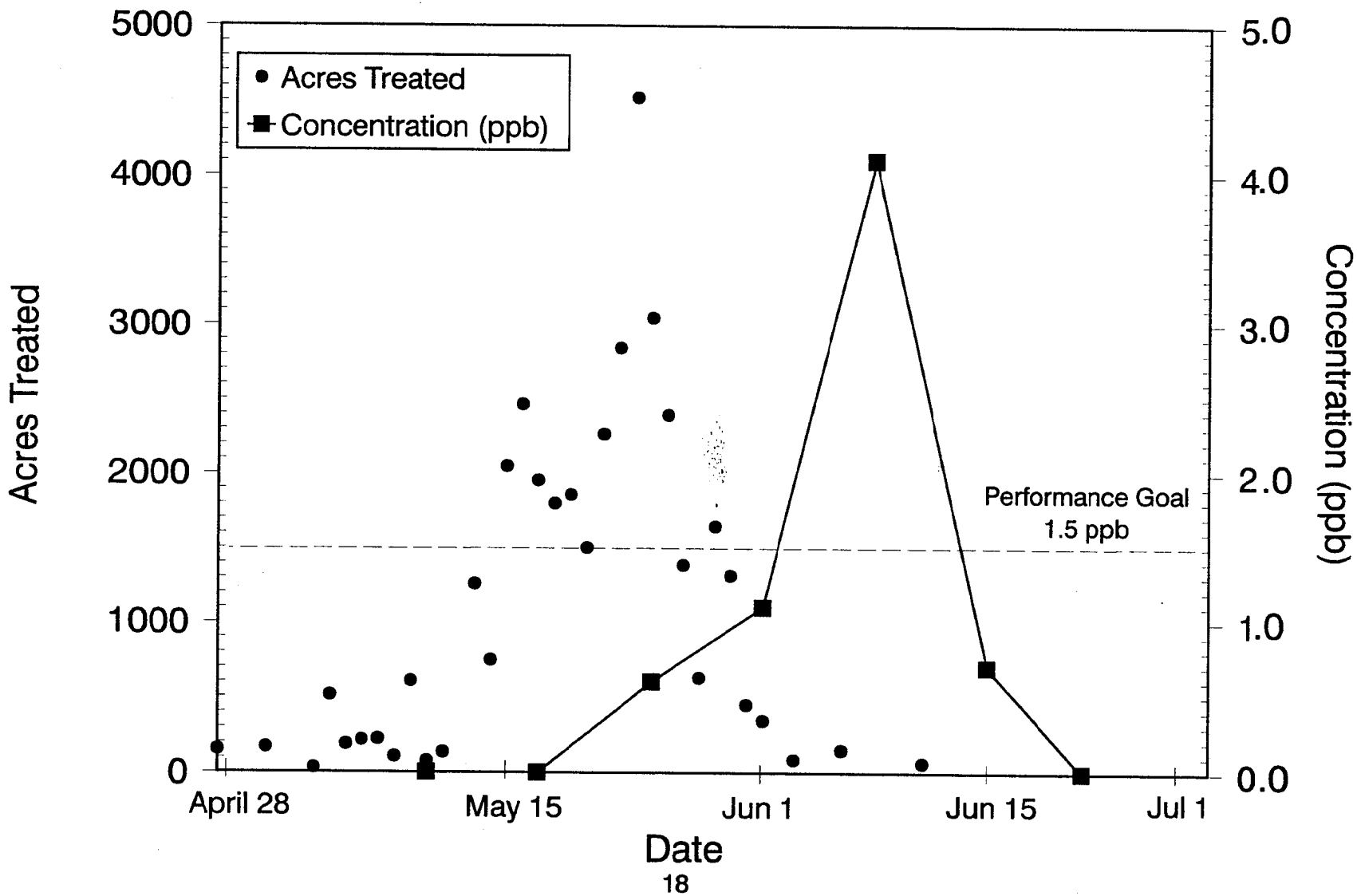


Figure 4. Acres treated with molinate in Colusa and Glenn Counties and concentrations of molinate in the Colusa Basin Drain near SR20 in 1999.

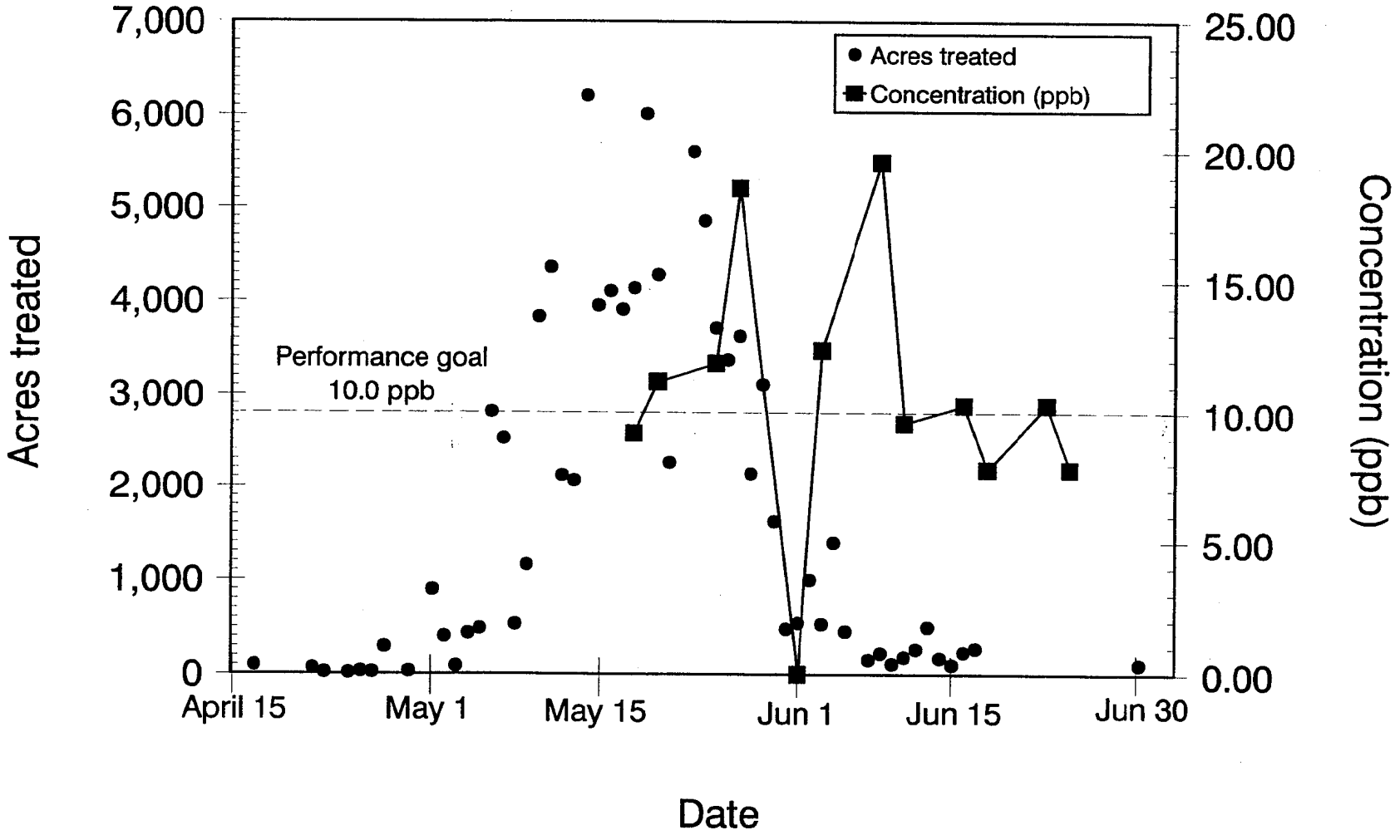


Figure 5. Acres treated with molinate in Butte County and concentrations of molinate in Butte Slough near SR20 in 1999.

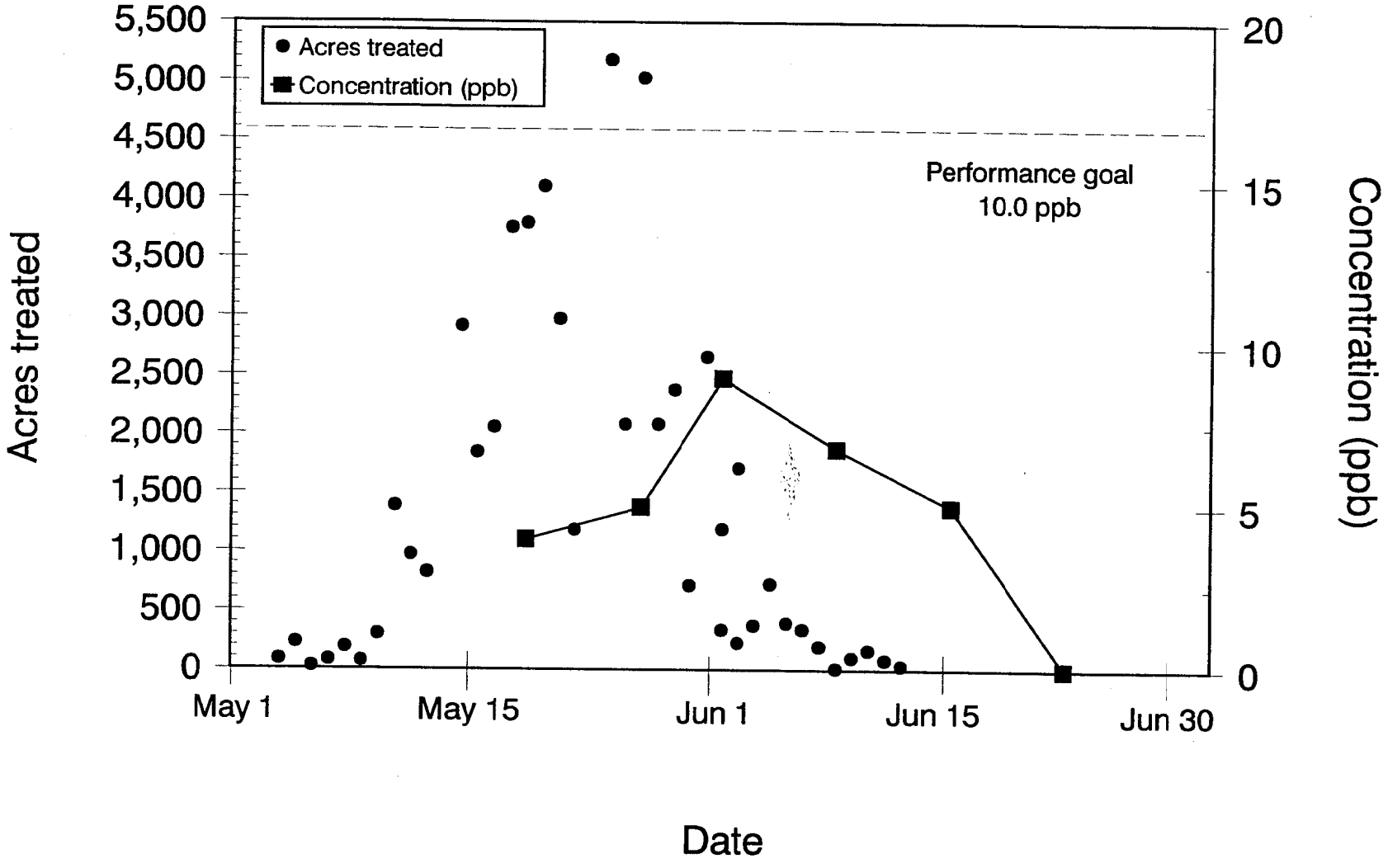


Figure 6. Acres treated with carbofuran in Colusa and Glenn Counties and concentrations of carbofuran in the Colusa Basin Drain near SR20 in 1999.

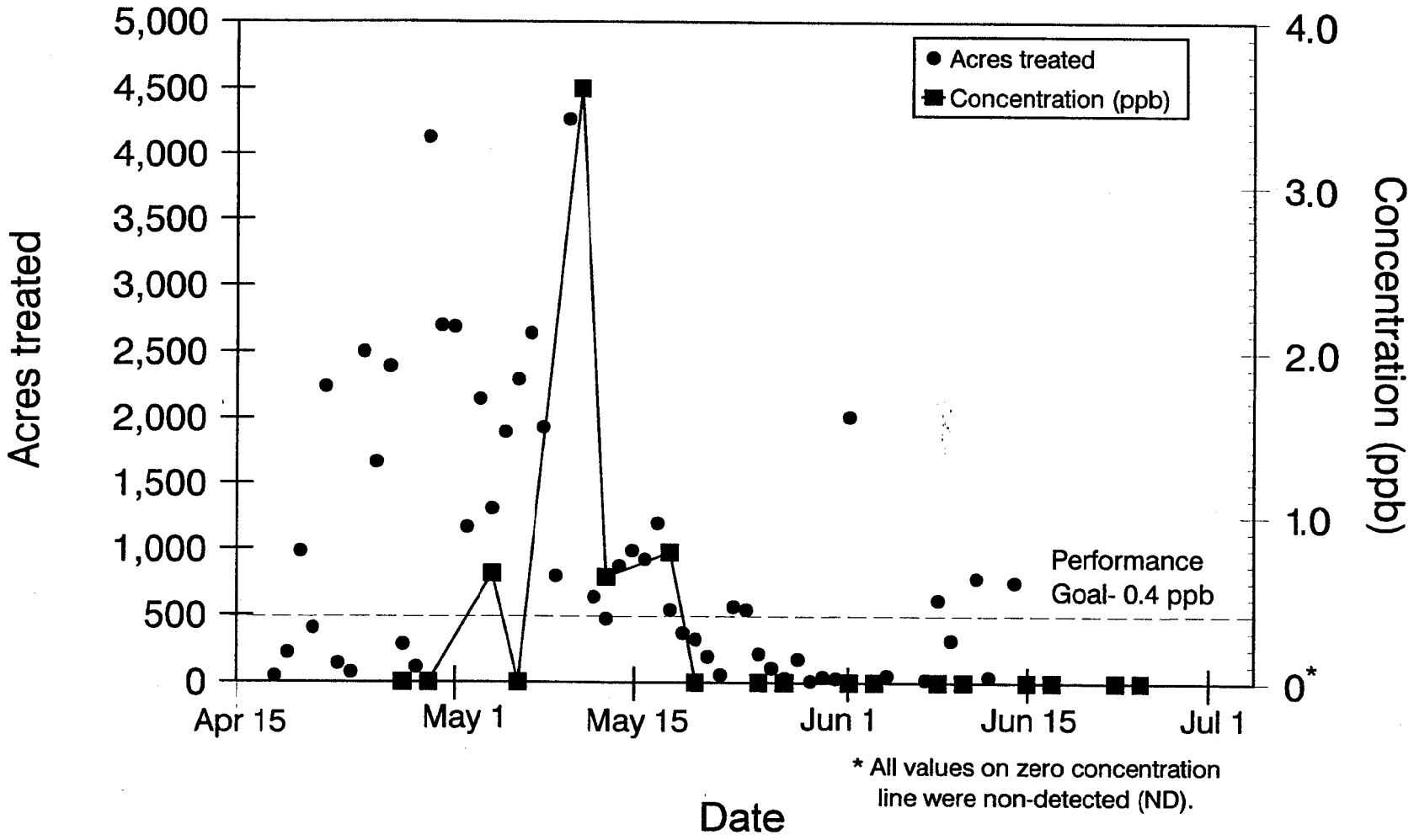


Table 7. Total acres treated and pounds active ingredient (AI) applied of Abolish and Bolero (Thiobencarb) in Glenn and Colusa counties 1994-1998.

		Number of Applications		Abolish		Bolero		Combined Totals	
	Year	Abolish	Bolero	Acres Treated	LBS AI	Acres Treated	LBS AI	Total Acres	Total Lbs AI
Colusa County	1994	83	205	6,446	25,559	15,852	87,406	**22,298**	**112,965**
	1995	149	376	13,706	60,937	27,962	112,158	**41,668**	**173,095**
	1996	154	563	13,051	54,700	45,024	188,420	**58,075**	**242,120**
	1997	201	858	16,178	68,746	62,254	242,907	**78,432**	**311,653**
	1998	90	587	7,628	29,595	46,142	184,915	**53,770**	**214,510**
Glenn County	1994	82	50	5,021	19,583	3,777	14,435	**8,798**	**34,018**
	1995	59	51	3,977	15,716	3,378	13,320	**7,355**	**29,036**
	1996	31	139	1,406	6,808	11,149	40,066	**12,555**	**46,874**
	1997	55	245	2,328	9,189	17,509	67,044	**19,837**	**76,233**
	1998	61	364	3,255	12,289	25,639	101,671	**28,894**	**113,960**

Table 8. Peak thiobencarb concentrations in selected Sacramento Valley waterways[1] in 1981-1999.

	Concentration (ppb)[2]				
Year	CBD1	CBD5	SS1[3]	BS1	SR1
1981	21	23			
1982	57	170		10	6
1983	11	9	5		1
1984	8	14	8		1
1985	19	18	11		4
1986	7	7	4		1
1987	4	2	1	ND[4]	ND
1988	4	1	ND	1	ND
1989	1	1	ND	1	ND
1990	ND	ND	ND	2	ND
1991	ND	ND	ND	ND	ND
1992	6	7	2	10	ND
1993	5	4	ND	ND	ND
1994	16	37[5]	ND	1	
1995		4		1	ND
1996		16		2	ND
1997		12		2	ND
1998		11		2	ND
1999		11		4	:50

1. CBD1 Colusa Basin Drain at Roads 109 and 99E near Knight's Landing in Yolo County.
   CBD5 Colusa Basin Drain at Highway 20 in Colusa County.
   SS1 Sacramento Slough at DWR gauge station in Sutter County.
   BS1 Butte Slough at Highway 20 in Sutter County.
   SR1 Sacramento River at Village Marina in Sacramento County.

2. Concentration values are rounded to the nearest whole number.

3. Blanks indicate no data are available.

4. ND Not detected. Different detection limits (lowest quantifiable concentration) were reported during this period, all of which were less than or equal to 1.0 ppb.

5. A second extraction and analysis was conducted with a rounded result of 40 ppb.

Table 9. Thiobencarb concentrations at Colusa Basin Drain (CBD5) from 1994-1999.
Bolded numbers indicate performance goal violations.

1994		1995		1996		1997		1998		1999	
Date	**ppb**	**Date**	**ppb**	**Date**	**ppb**	**Date**	**ppb**	**Date**	**ppb**	**Date**	**ppb**
3-May	ND	14-Apr	ND	1-Apr	ND	31-Mar	ND	31-Mar	ND	13-Apr	ND
5-May	ND	16-May	NS	23-Apr	ND	22-Apr	ND	5-May	ND	27-Apr	NS
9-May	ND	18-May	1.2	25-Apr	ND	24-Apr	ND	7-May	ND	29-Apr	NS
12-May	ND	23-May	NS	30-Apr	ND	29-Apr	0.7	12-May	ND	4-May	NS
16-May	**37.4**	25-May	0.87	2-May	ND	1-May	ND	14-May	ND	6-May	NS
19-May	0.768	30-May	NS	7-May	ND	6-May	**1.9**	19-May	ND	11-May	0.7
22-May	1.04	1-Jun	**2.68**	9-May	ND	8-May	1.4	21-May	ND	13-May	**1.6**
26-May	0.992	6-Jun	NS	14-May	**1.5**	13-May	**3.6**	26-May	1.2	18-May	**4.2**
30-May	0.66	8-Jun	**3.7**	16-May	**2.9**	15-May	**4.1**	28-May	**1.8**	20-May	**3.7**
2-Jun	4.0	13-Jun	NS	18-May	**4.65**	20-May	**12.3**	2-Jun	**9.1**	25-May	**10.0**
6-Jun	0.5	15-Jun	0.872	21-May	**5.0**	22-May	**6.0**	4-Jun	**9.7**	27-May	**10.9**
9-Jun	ND	20-Jun	NS	23-May	**6.8**	27-May	**4.4**	9-Jun	**6.4**	1-Jun	**6.3**
13-Jun	ND	22-Jun	0.758	26-May	**4.54**	29-May	**3.3**	11-Jun	**6.6**	3-Jun	**4.8**
16-Jun	ND	27-Jun	NS	28-May	**7.7**	3-Jun	**4.2**	16-Jun	**11.0**	8-Jun	**10.9**
20-Jun	ND	29-Jun	**2.17**	30-May	1.10	5-Jun	**2.6**	18-Jun	**8.4**	10-Jun	**3.5**
23-Jun	ND	3-Jul	NS	4-Jun	**3.00**	10-Jun	**2.0**	23-Jun	**2.8**	15-Jun	**2.0**
27-Jun	0.508	6-Jul	0.682	6-Jun	**5.9**	12-Jun	**2.0**	25-Jun	**2.0**	17-Jun	**2.1**
30-Jun	0.63	11-Jul	NS	11-Jun	**16.2**	17-Jun	1.3	30-Jun	**2.2**	22-Jun	**2.3**
4-Jul	ND	13-Jul	0.5	13-Jun	**3.7**	19-Jun	**1.5**	2-Jul	**1.8**	24-Jun	**2.1**
7-Jul	ND	18-Jul	NS	18-Jun	**3.9**	24-Jun	1.3	7-Jul	**1.9**		
		20-Jul	ND	20-Jun	**4.0**	26-Jun	1.3	9-Jul	**1.9**		
				25-Jun	1.0						
				27-Jun	1.3						

Key to abbreviations:
ppb parts per billion
ND Not detected
NS Not sampled

Figure 7. Thiobencarb use in Glenn and Colusa counties based on one square-mile sections from 1994-1996.

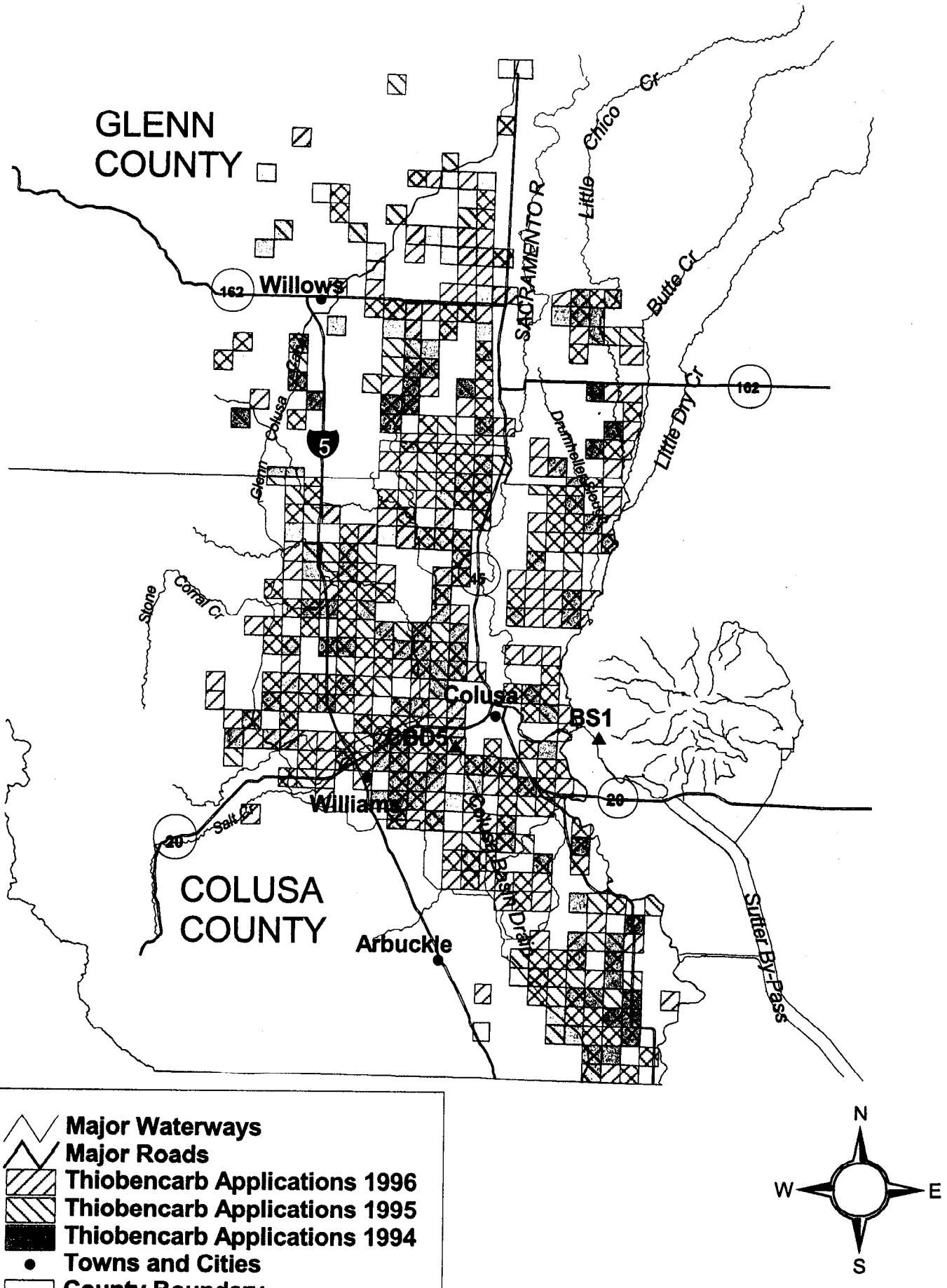
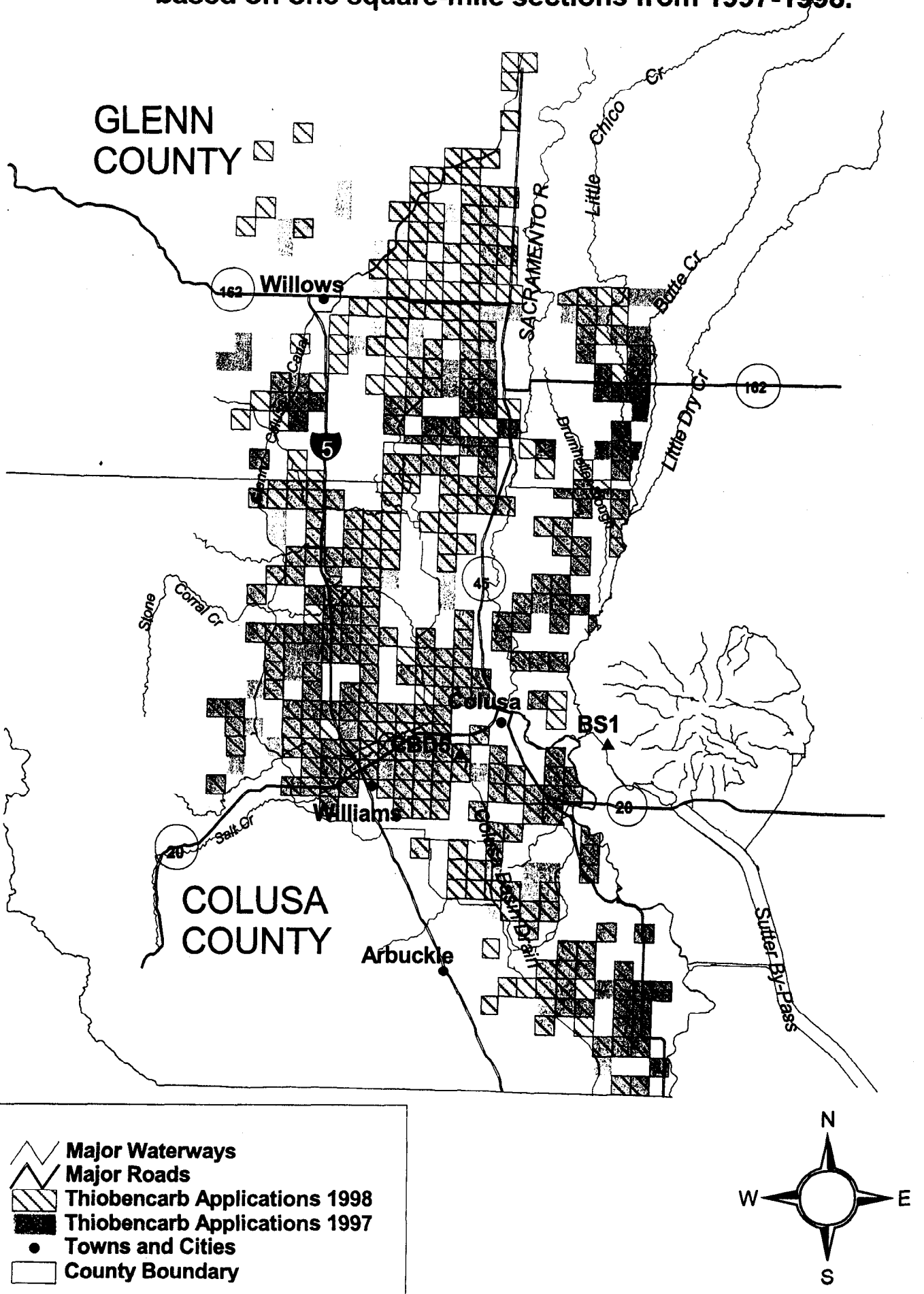


Figure 8. Thiobencarb use in Glenn and Colusa counties based on one square-mile sections from 1997-1998.



APPENDIX A

California Environmental Protection Agency
James M. Strock, *Secretary for Environmental Protection*

State of Californi
Pete Wilson, *Govern*

DEPARTMENT OF PESTICIDE REGULATION
James W. Wells, *Director*

1020 N Street, Room 100
Sacramento, California 95814-5624

March 8, 1995

TO: COUNTY AGRICULTURAL COMMISSIONERS
IN RICE-GROWING COUNTIES OF THE SACRAMENTO VALLEY

SUBJECT: 1995 RICE PESTICIDES PROGRAM

On January 27, 1995, the Central Valley Regional Water Quality Control Board (CVRWQCB) approved management practices that limit discharges of the rice pesticides molinate (Ordram®), thiobencarb (Bolero® and Abolish®), carbofuran (Furadan®), methyl parathion, and malathion to surface waters. The CVRWQCB staff sent you a copy of the agenda item for this meeting along with a report prepared by my staff entitled: "Information on Rice Pesticides Submitted to the Central Valley Regional Water Quality Control Board" (December 28, 1995). This letter contains details on the 1995 rice pesticide program including conditions you are asked to implement for rice pesticide permits.

Most of the provisions of the rice pesticide program relating to routine water-holding times will remain the same as in 1994. However, changes will apply for regions previously considered hydrologically isolated to ensure compliance with the CVRWQCB's prohibition of acutely toxic discharges to waters that support aquatic habitat.

In addition, the CVRWQCB approved management plans to promote an educational effort with the rice-growing community that stresses the continued importance of drift prevention and introduces the potential contributions seepage water makes to the pesticide concentrations in the agricultural drains. Drift control provisions remain as they were in 1994. Continue to have your staff impress upon commercial applicators the need to better control applications of pesticides near agricultural drains and focus additional enforcement efforts, when possible, on aerial applications made to fields adjacent to agricultural drains. My

staff is working with representatives from the rice-growing community to propose voluntary measures growers might take to prevent rice field seepage water from entering surface waterways prior to the end of the required holding periods for field water. Your assistance in distributing forthcoming information to growers on seepage water containment will be appreciated.

The key features of the 1995 program are as follows:

1. The basic water management requirements for users of those pesticides that require permits (molinate, thiobencarb, methyl parathion, and carbofuran) are the same as in 1994. The water management requirements for the 1995 program as approved by the CVRWQCB are outlined in Attachments 1-4. Holding times for all applications (not just the "preflood surface" applications) of Abolish decreased to 19 days. Areas considered hydrologically isolated must hold water from fields treated with molinate and thiobencarb for longer periods (11 and 19 days, respectively) than previously required. Exceptions for some fields treated with thiobencarb are described in Attachment 2.

2. The water management practices following malathion use in rice are still voluntary. Attachment 5, which describes these practices, was designed to be distributed to growers.

3. Management practices for containing seepage water from rice fields and the pesticides this water may contain will be addressed through forthcoming educational measures and implemented through voluntary efforts by growers.

4. Water management practices within closed systems remain the same for 1995. The Department of Pesticide Regulation (DPR) will conduct a study on toxicity of water in multigrower closed systems to determine any need for longer holds in future years.

5. The emergency release provisions remain the same as in 1994 to continue to meet the CVRWQCB's prohibition of acutely toxic discharges to waters that support aquatic habitat. Growers with fields treated with Ordram may apply for an emergency release after a minimum holding period of 11 days. Fields will be prohibited from using the emergency release management option until the standard holding times for the insecticides have elapsed. Fields treated with Bolero do not qualify for the emergency release option. Attachment 6 is the form which permittees are to fill out as part of their request for an emergency release. Those that are granted an emergency release must also fill out an additional form (Attachment 7) and deliver it to your office. Failure to submit this form will be considered a permit violation. DPR staff will request the information on the completed forms later this summer.

6. Growers using the emergency release provision more than once or cited for water holding violations more than once must make improvements in water management capabilities. Such improvements will be required as conditions on future pesticide use permits and may include retention basins, ponds, or tailwater recovery systems.

7. Drift control provisions will again be an important part of the program. Methyl parathion application provisions are the same as in 1994. They include the use of an effective drift control agent, use of D8 nozzles, wind speeds $\leq$ 5 miles per hour, and a 300-foot downwind buffer zone left untreated. Attachments 8, 9, 10, and 11 outline the provisions for aerial applications of granular and liquid formulations of rice pesticides included in the program. Special attention should be directed, when possible, towards enforcement efforts during aerial applications at sites adjacent to agricultural drains.

8. Weir boxes that control discharges of water from rice fields shall be fully secured during pesticide holding times. A soil berm must be in place in front of each of these boxes

to a level above the water line, or drop boxes shall be filled with soil to a level above the water line. The need for such berms in fields where nonconventional water management systems are utilized, e.g., static/positive pressure systems, may be evaluated by County Agricultural Commissioner's office staff on a case-by-case basis.

Information transmittal of rice pesticide use data from the county offices to DPR will be handled at the end of July rather than on a weekly basis. My staff will discuss the details of this process with your deputies.

Monitoring results will not be available this year until approximately five weeks after sample collection. DPR will continue to send monitoring program results to your offices, via facsimile, when available.

Thank you for your assistance. Your cooperation continues to help make the program a real success. If you have questions, please contact Dr. Nan Gorder at (916) 324-4265 or Mr. Marshall Lee at (916) 324-4269.

Sincerely,

James W. Wells
Director
(916) 445-4000

cc: Dr. Nan Gorder
Mr. Marshall Lee

APPENDIX A

ATTACHMENT 1

MOLINATE WATER MANAGEMENT REQUIREMENTS – 1995

I. All water from fields treated with products containing molinate must be retained on the site of application for at least 28 days following application unless:

A. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 29 days following the last application of molinate within the system.

1. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

2. If the system includes drainage from more than permittee, water may be discharged from the application site into the system nine days following application.

B. The water is on acreage within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. All water on fields treated with molinate must be retained on the treated acreage until the twelfth day following application.

C. The water is on acreage treated with a preflood application of molinate. The label restrictions apply.

II. Fields not specified in I.A., I.B., and I.C. may resume discharging field water 29 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

ATTACHMENT 1

MOLINATE WATER MANAGEMENT REQUIREMENTS – 1995

III. The county agricultural commissioner may authorize the emergency release of tailwater 12 days following the last molinate application, following a review of a written request (Attachment 6), which clearly demonstrates the crop, is suffering because of the water management requirements. All water management requirements must be followed that are associated with other pesticides that my have been applied to the site. Additionally, the requester must describe preventative action that would avoid the need for future emergency releases. Under an emergency release variance, tailwater may be released only to the extent necessary to mitigate the documented problem. Those issued an emergency release must submit to the county agricultural commissioner a report (Attachment 7) indicating the time and duration of the emergency release and data that can be used to calculate the total amount of water release during the emergency release. Emergency release will only be granted for reasons related to rainfall, high winds, or other extreme weather conditions that cannot be moderated with management practices.

APPENDIX A

ATTACHMENT 1

SUPPLEMENT TO MOLINATE WATER MANAGEMENT REQUIREMENTS FOR MOLINATE – 1998

IV. The county agricultural commissioner may authorize the emergency release of Field water on the 12th day following the last molinate application, following The review of a written application that demonstrates salinity levels are damaging to the crop.

A. Applicants for such emergency releases must provide the following information:

1. all information indicated on the emergency release request form (Attachment A), including a description of the severity and extent of salinity damage.

2. electrical conductivity (EC) measurements, expressed as deciSiemans perimeter (dS/m) or microSiemans per centimeter (μS/cm), from field water in each paddy suspected of having salinity problems. To most effectively demonstrate salinity problems, measurements should be taken wherever salinity problems are evident.

3. the instrument (make and model) used to determine EC measurements. The instrument must have a sensitivity range that accommodates the full range of EC values in intake and paddy water (usually a range of 0-5.0 dS/m or 0-5,000 μS/cm should be sufficient) and should have a resolution of not less than five percent. The instrument must be calibrated according to the manufacturer's instructions. The applicant must specify the method of temperature compensation (i.e., automatic, conversion table).

4. who made the EC measurements.

5. the source of irrigation water (e.g. district supply canal, drainage canal, well etc.).

ATTACHMENT 1

MOLINATE WATER MANAGEMENT REQUIREMENTS- 1998

B. An emergency release may be granted only if all of the following conditions are satisfied.

1. All required information is provided.

2. Water management requirements for rice pesticides other than molinate are satisfied.

3. EC of paddy water exceeds 2.0 dS/m or 2,000 μS/cm.

4. The county agricultural commissioner or his or her staff inspects the site.

C. Water may be released from paddies where EC measurements exceed 2.0 dS/m or 2,000 μS/cm and from paddies downgradient from such paddies within the same field. Water shall only be released in an amount necessary to mitigate the salinity problem.

D. Those issued an emergency release must submit to the county agricultural commissioner a report (Attachment B) indicating the time and duration of the emergency release and data that can be used to calculate the total amount of water released during the emergency release.

APPENDIX A

ATTACHMENT 2

THIOBENCARB WATER MANAGEMENT REQUIREMENTS- 1995
Revised April 7, 1995

I. For rice fields treated with thiobencarb in the Sacramento Valley (north of the line defined by Roads E10 and 116 in Yolo County and the American River in Sacramento County), except those treated with Abolish® 8EC :

A. All water on treated fields must be retained on the treated fields for at least 30 days following application unless:

1. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 20 days following the last application of thiobencarb within the system.

a. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

b. If the system includes drainage from more than one permittee, water may be discharged from the application site into the system seven days following application.

2. The water is on fields within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. Water from such fields must be held at least 19 days, unless the county agricultural commissioner evaluates such sites. If the commissioner verifies the hydrologic isolation of the fields, the water may be released seven days after application.

B. Fields not specified in I.A.1. and I.A.2. may resume discharging field water 31 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

APPENDIX A

ATTACHMENT 2

THIOBENCARB WATER MANAGEMENT REQUIREMENTS- 1995
Revised April 7, 1995

II. For rice fields treated with thiobencarb in the Southern Area (south of the line defined by Roads E10 and 116 in Yolo County and the American River in Sacramento County), except those treated with Abolish 8EC:

A. All water on treated fields must be retained on the treated fields for at least 19 days following application unless:

1. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 20 days following the last application of thiobencarb within the system.

a. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

b. If the system includes drainage from more than one permittee, water may be discharged from the application site into the system seven days following application.

2. The water is on fields within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. Water from such fields may be released seven days after application if the county agricultural commissioner evaluates such sites and verifies the hydrologic isolation of the fields.

B. Fields not specified in II.A.1. and II.A.2. may resume discharging field water 20 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

III. For all areas, fields treated with Abolish® 8EC:

A. All water on treated fields must be retained on the treated fields for at least 19 days following application unless:

1. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 20 days following the last application within the system.

ATTACHMENT 2

THIOBENCARB WATER MANAGEMENT REQUIREMENTS – 1995
revised April 7, 1995

a. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

b. If the system includes drainage from more than one permittee, water may be discharged from the application site into the system seven days following application.

2. The water is on fields within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. Water from such fields may be released seven days after application if the county agricultural commissioner evaluates such sites and verifies the hydrologic isolation of the fields.

B. Fields not specified in III.A. may resume discharging field water 20 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

ATTACHMENT 2

SUPPLEMENT TO WATER MANAGEMENT REQUIREMENTS FOR THIOBENCARB –1998

IV. The county agricultural commissioner may authorize the emergency release of field water on the 20th day following the last thiobencarb application, following the review of a written application that demonstrates salinity levels are damaging to the crop.

A. Applicants for such emergency releases must provide the following information:

1. all information indicated on the emergency release request form (Attachment A), including a description of the severity and extent of salinity damage.

2. electrical conductivity (EC) measurements, expressed as deciSiemans per meter (dS/m) or microSiemans per centimeter (μS/cm), from field water in each paddy suspected of having salinity problems. To most effectively demonstrate salinity problems, measurements should be taken wherever salinity problems are evident.

3. the instrument (make and model) used to determine EC measurements. The instrument must have a sensitivity range that accommodates the full range of EC values in intake and paddy water (usually a range of 0-5.0 dS/m or 0-5,000 μS/cm should be sufficient) and should have a resolution of not less than five percent. The instrument must be calibrated according to the manufacturer's instructions. The applicant must specify the method of temperature compensation (i.e., automatic, conversion table).

4. who made the EC measurements.

5. the source of irrigation water (e.g. district supply canal, drainage canal, well, etc.).

B. An emergency release may be granted only if all of the following conditions are satisfied:

1. All required information is provided.

2. Water management requirements for rice pesticides other than thiobencarb are satisfied.

3. EC of paddy water exceeds 2.0 dS/m or 2,000 μS/cm.

4. The County Agricultural Commissioner or his or her staff inspects the site.

ATTACHMENT 2

C. Water may be released from paddies where EC measurements exceed 2.0 dS/m or 2,000 μS/cm and from paddies down gradient from such paddies within the same field. Water shall only be released in an amount necessary to mitigate the salinity problem.

D. Those issued an emergency release must submit to the county agricultural commissioner a report (Attachment B) indicating the time and duration of the emergency release and data that can be used to calculate the total amount of water released during the emergency release.

APPENDIX A

ATTACHMENT 3

CARBOFURAN WATER MANAGEMENT REQUIREMENTS – 1995

I. Pre-flood applications of carbofuran to rice fields must be incorporated into the soil.

II. Water shall not be discharged from sites treated with carbofuran for at least 28 days following initial flooding (pre-flood application) or following application (post-plant application) unless the treated water is contained within tailwater recovery systems, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 29 days following the last application of carbofuran within the system.

   A. If the system was under the control of one permittee, treated water may be discharged from the application site in a manner consistent with product labeling.

   B. If the system includes drainage from more than one permittee, treated water may be discharged from the application site into the system nine days following application.

ATTACHMENT 4

METHYL PARATHION WATER MANAGEMENT REQUIREMENTS – 1995

Water shall not be discharged from sites treated with methyl parathion for at least 24 days following application unless the treated water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 25 days following the last application of methyl parathion within the system. Treated water may be discharged from the application site in a manner consistent with product labeling.

APPENDIX A

ATTACHMENT 5

MALATHION WATER MANAGEMENT REQUIREMENTS- 1995

The Central Valley Regional Water Quality Control Board has approved a water management practice following malathion use in rice that will help meet 1995 water quality performance goals for malathion in surface water. Malathion is currently not a restricted material and not subject to use requirements or permit conditions. However, it is important that growers comply with this practice.

Water from fields treated with malathion should be held on the site of application for at least four days following application.

Water quality monitoring will be conducted in 1995 to determine the adequacy of this practice in managing malathion discharges. If malathion levels do not adequately meet the performance goal, a more formal regulatory program may be implemented in future years.

ATTACHMENT 6

EMERGENCY RELEASE

Grower:_____ Permit No.:_____
Address:_____ Zip:_____
Field location:_____ Site No._____
(Attach detailed map)

Chemical applied:_____ Chemical applied:_____

Rate of application:_____ Rate of application:_____

Date of application:_____ Date of application:_____

Average water depth
at time of application:_____ Average water depth
at time of application:_____

Chemical applied:_____ Chemical applied:_____

Rate of application:_____ Rate of application:_____

Date of application:_____ Date of application:_____

Average water depth
at time of application:_____ Average water depth
at time of application:_____

Starting date of emergency release:_____
Acres treated in field:_____ Laser leveled? Yes_____No_____
Type of irrigation system: Flow through____ Recycle____ Static____ Other____
Date flooding began:_____ No. of days it takes to fill field:_____
Describe problem that led to emergency release:_____
_____
_____
Steps that can be taken to prevent emergency releases from this field in future years:_____
_____
_____
Recommendation (attached) by:_____
Applications by:_____
Grower's signature:_____ Date:_____
Approved by:_____
Agricultural Biologist

ATTACHMENT 7

EMERGENCY RELEASE

Grower: _____ Permit No.: _____
Address: _____ Zip: _____
Field location: _____ Site No.: _____
Beginning date of release: _____ Ending date: _____

The grower must determine the amount of water discharged during the emergency release period. To do this, measure the width of each weir opened to allow the discharge. Then, on a daily basis, measure the height of water flowing over each weir. Record all information in the table below.

Weir 1		Weir 2		Weir 3	
Width:		Width:		Width:	
Date	Height of water	Date	Height of water	Date	Height of water

ATTACHMENT 8

DRIFT CONTROL REQUIREMENTS FOR GRANULAR MOLINATE, THIOBENCARB, AND CARBOFURAN APPLIED TO RICE – 1995

Granular molinate, thiobencarb, or carbofuran drifting into waterways (i.e., drainage canals) or onto levees or roadways adjacent to waterways will be considered environmental contamination. Applicators found in violation will be liable for a civil penalty.

Granular molinate, thiobencarb, or carbofuran shall not be applied by air if wind speed is greater than seven miles per hour to avoid drift into drainage canals and ditches.

APPENDIX A

ATTACHMENT 9

DRIFT CONTROL REQUIREMENTS FOR LIQUID THIOBENCARB APPLIED TO RICE – 1995

I. Aerial Applications

A. No aerial applications of liquid formulations of thiobencarb to rice shall be:

1. Discharged more than ten feet above the crop or target. Discharge shall be shut off whenever it is necessary to raise the equipment over obstacles such as trees or poles.

2. Applied when wind velocity is more than seven miles per hour.

3. Applied by aircraft except as follows:

   a. The flow of liquid to aircraft nozzles shall be controlled by a positive shutoff system as follows:

      i. Each individual nozzle shall be equipped with a check valve and the flow controlled by suckback device or a boom pressure release device; or

      ii. Each individual nozzle shall be equipped with a positive action valve.

   b. Aircraft nozzles shall not be equipped with any device or mechanism which would cause a sheet, cone, fan, or similar type dispersion of the discharged material except as otherwise provided.

   c. Aircraft boom pressure shall not exceed 40 pounds per square inch.

   d. Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.

   e. Fixed wing aircraft and helicopters operating in excess of 60 miles per hour shall be equipped with jet nozzles having and orifice of not less than 1/16 inch diameter.

   f. Working boom length on fixed wing aircraft shall not exceed ¾ of the wing span; the working boom length of helicopters shall not exceed 6/7 of the total rotor length or ¾ of the total rotor where the rotor length exceeds 40 feet.

ATTACHMENT 9

g. Helicopters operating at 60 miles per hour or less shall be equipped with:

i. Nozzles having an orifice not less than 1/16 inch in diameter. A number 46 (or equivalent) or larger whirlplate may be used; or

ii. Fan nozzles with a fan angle number not larger than 80 degrees and a flow rate not less than on gallon per minute at 40 pounds per square inch pressure (or equivalent).

B. Special precautions should be taken to avoid off-site deposition of liquid formulations of pesticides when applications are made adjacent to agricultural drains.

II. Ground Applications – Ground applications of liquid thiobencarb must be applied as per label instructions.

ATTACHMENT 10

DRIFT CONTROL RECOMMENDATIONS FOR MALATHION APPLIED TO RICE – 1995

I. No aerial applications of liquid formulations of malathion to rice shall be:

A. Discharged more than ten feet above the crop or target. Discharge shall be shut off whenever it is necessary to raise the equipment over obstacles such as trees or poles.

B. Applied when wind velocity is more than seven miles per hour.

C. Applied by aircraft except as follows:

1. The flow of liquid to aircraft nozzles shall be controlled by a positive shutoff system as follows:

   a. Each individual nozzle shall be equipped with a check valve and the flow controlled by suckback device or a boom pressure release device; or

   b. Each individual nozzle shall be equipped with a positive action valve.

2. Aircraft nozzles shall not be equipped with any device or mechanism which would cause a sheet, cone, fan, or similar type dispersion of the discharged material except as otherwise provided.

3. Aircraft boom pressure shall not exceed 40 pounds per square inch.

4. Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.

5. Fixed wing aircraft and helicopters operating in excess of 60 miles per hour shall be equipped with jet nozzles having an orifice of not less than 1/16 inch diameter.

6. Working boom length on fixed wing aircraft shall not exceed ¾ of the wing span; the working boom length of helicopters shall not exceed 6/7 of the total rotor length or ¾ of the total rotor where the rotor length exceeds 40 feet.

7. Helicopters operating at 60 miles per hour or less shall be equipped with:

   a. Nozzles having an orifice not less than 1/16 inch in diameter. A number 46 (or equivalent) or larger whirlplate may be used;
   or

   b. Fan nozzles with a fan angle number not larger than 80 degrees and a flow rate not less than one gallon per minute at 40 pounds per square inch pressure (or equivalent).

II. Special precautions should be taken to avoid off-site deposition of liquid formulations of pesticides when applications are made adjacent to agricultural drains.

APPENDIX A

ATTACHMENT 11

DRIFT CONTROL REQUIREMENTS FOR METHYL PARATHION APPLIED TO RICE – 1995

I. Aerial Applications

A. No aerial applications of liquid formulations of methyl parathion to rice shall be:

1. Discharged more than ten feet above the crop or target. Discharge shall be shut off whenever it is necessary to raise the equipment over obstacles such as trees or poles.

2. Applied within a 300 foot downwind buffer zone from any agricultural drain.

3. Applied when wind velocity is more than five miles per hour.

4. Applied without an effective drift control agent.

5. Applied by aircraft except as follows:

a. The flow of liquid to aircraft nozzles shall be controlled by a positive shutoff system as follows:

i. Each individual nozzle shall be equipped with a check valve and the flow controlled by suckback device or a boom pressure release device; or

ii. Each individual nozzle shall be equipped with a positive action valve.

b. Aircraft nozzles shall not be equipped with any device or mechanism which would cause a sheet, cone, fan, or similar type dispersion of the discharged material except as otherwise provided.

c. Aircraft boom pressure shall not exceed 40 pounds per square inch.

d. Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.

e. Fixed wing aircraft and helicopters operating in excess of 60 miles per hour shall be equipped with jet nozzles having an orifice of not less than 1/8 inch in diameter.

f. Working boom length on fixed wing aircraft shall not exceed ¾ of the wing span; the working boom length of helicopters shall not exceed 6/7 of the total rotor length or ¾ of the total rotor where the rotor length exceeds 40 feet.

g. Helicopters operating at 60 miles per hour or less shall be equipped with:

i. Nozzles having an orifice not less than 1/8 inch in diameter. A number 46 (or equivalent) or larger whirlplate may be used; or

ii. Fan nozzles with a fan angle number not larger than 80 degrees and a flow rate not less than one gallon per minute at 40 pounds per square inch pressure (or equivalent).

B. Special precautions should be taken to avoid off-site deposition of liquid formulations of pesticides when applications are made adjacent to agricultural drains.

II. Ground Applications – Ground equipment other than handguns shall be equipped with:

A. Nozzles having an orifice not less than 1/16 inch in diameter or equivalent, and operated at a boom pressure not to exceed 30 pounds per square inch; or

B. Low pressure fan nozzles with a fan angle number not larger than 80 degrees and fan nozzle orifice not smaller than 0.2 gallon per minute flow rate or equivalent, and operated at a boom pressure not to exceed 15 pounds per square inch.

APPENDIX B

State of California

Memorandum

To : County Agricultural Commissioners from Rice Producing Counties

Date: March 24, 1995

Place: Sacramento

Phone: (916) 324-4265

From : **Department of Pesticide Regulation** - John Sanders, Branch Chief
Environmental Monitoring and Pest Management

Subject : Rice Pesticides Program
Follow-up on Seepage Water Management Voluntary Guidelines

The 1995 rice pesticide permit conditions were recently mailed to you office with a cover letter dated March 20 and signed by Jim Wells. That letter referred to forthcoming information regarding voluntary guidelines for seepage water management. My staff, with input from representatives of the rice industry, county agricultural commissioners, United States Department of Agriculture (USDA), and others, developed the attached seepage water management voluntary guidelines which are meant to be reproduced and handed out when issuing permits for the use of rice pesticides. Your assistance in this matter is greatly appreciated.

Additionally, for growers interested in technical specifications on berm construction, a second handout is provided from the USDA Natural Resources Conservation Service entitled "Closed Rice Water Management Systems". This handout was developed for the California Rice Water Quality Demonstration Project to describe specifications for various closed systems, but it includes useful technical specifications for sound berm construction as well. We are supplying you with camera-ready copies of this handout so your office can make good reproductions for interested growers.

Should you have any questions, please contact Nan Gorder at (916) 324-4265 or Marshall Lee at (916) 324-4269.

for

John S. Sanders
Branch Chief
(916) 324-4100

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SURNAME			

SEEPAGE WATER MANAGEMENT: VOLUNTARY GUIDELINES

What is seepage?

Movement of water through a rice field levee to an adjacent area.

Why is seepage water a problem?

Seepage water can contain high concentrations of molinate, carbofuran, and potentially other chemicals as well, during the holding periods. If this water is allowed to reach agricultural drains, it could impact efforts to meet performance goals and result in toxicity to aquatic organisms.

What evidence is there to indicate seepage water contains pesticides?

Molinate was detected in rice seepage water from six out of six sites with concentrations ranging from 44 to 1300 parts per billion (ppb). Carbofuran was detected in rice seepage water collected from three out of three sites with concentrations ranging from 0.4 to 11 ppb. (Water samples were simultaneously collected from adjacent fields and carbofuran concentrations were as high or higher than in seepage water.) The current performance goal in the agricultural drains for molinate is 10 ppb and for carbofuran is 0.4 ppb.

Two demonstration sites were set up with tarps covering the seepage area to prevent molinate deposition from drift. Concentrations of molinate from these sites ranged from 37 to over 700 ppb (corrected for background concentrations).

Why are growers being asked to make voluntary efforts to control seepage water?

The Central Valley Regional Water Quality Control Board and the Department of Pesticide Regulation believe it is important that the rice growing community become aware of the potential impact of contaminated seepage water reaching the agricultural drains and have the opportunity to voluntarily address the problem. *If these voluntary efforts are sufficient to minimize the impact of seepage water on the agricultural drains, no future regulatory action will be needed.*

VOLUNTARY GUIDELINES

1. Prevent seepage water from leaving the rice field during the holding period through loosely constructed levees by
   - running a tractor tire or track on top of existing border levees, and
   - ensuring that newly constructed levees are built with mineral soils (not organic matter and plant residues), adequate width, and solid cores (when building levees, run tractor tire or track on top to firm up core of check). Double berming is another method of containing seepage.
   - using technical recommendations for levee construction offered by the USDA in a handout entitled "Closed Rice Water Management Systems," available from your county agricultural commissioner.

2. Prevent water in seepage areas from reaching the drains during the holding period by
   - directing or pumping seepage water to fallow land, and
   - blocking the exit of water from the seepage ditch to agricultural drains.

3. Communicate with applicators to establish the common goal of keeping drift away from seepage ditches, drains, border levees, and roads. Dry material on roads and dry ground is considered to be environmental contamination with the applicator liable for a civil penalty. This material remains viable and any runoff from these areas during wet weather should be held on your property to avoid contaminating agricultural drains.

4. Prevent leakage from levees by inspecting and repairing rodent damage during the holding periods.

flow and adjustments in basin water depth. A pump with pipeline or return ditch is used to convey the tail water back to an upper level rice basin. The minimum sump storage requirement shall be the volume of runoff generated by the normal flow off the bottom weir for 12 hours or 20 percent of the irrigation inflow for 12 hours, whichever is greater. The recirculating pump shall have a capacity equal to or greater than the mean inflow rate.

Static Water Systems - Systems that independently supply water to each basin within the field. Flap-gated inlet pipes or other devices keep pesticide treated water on the field and out of public water ways. It operates on the principle of a variable demand supply, only the amount of water needed to replace evapotranspiration and other losses is placed in each basin either from:

(i) a source ditch with flashboard weirs in the ditch and flap-gated inlet pipes into each basin, or

(ii) a pipeline or ditch with adjustable inlet float control valves into each basin.

Irrigation water in the supply ditch shall be protected from contamination by means of flap gates and other such anti-back flow devices as are appropriate. The flap gates help to keep pesticide treated field water out of the supply ditch and out of public waterways. The capacity of the static system shall be adequate to flood up the basin to the desired depth in 3 days or less.

SYSTEM OPERATION

The owner or producer is responsible for the preparation and implementation of an operation and maintenance plan. The plan will include sufficient instructions to insure that the system achieves its intended purpose.

Revised 11/94

USDA NRCS Design Standards:

587 - Water Control Structures
430 - Irrigation Pipelines
388 - Field Ditches
356 - Dikes
464 - Land Leveling
206 - Rice Water Management Systems

Contact your local USDA Natural Resources Conservation Service:

Auburn	(916) 823-6830
Colusa	(916) 458-2931
Willows	(916) 934-4601
Woodland	(916) 662-2037
Yuba City	(916) 674-1461

Contact your local USDA Consolidated Farm Services Agency for cost-sharing information.

Contact your local U.C. Cooperative Extension Office or ANR Publications at (510) 642-2431 for the following publications:

Rice Irrigation Systems for Irrigation Water Management. Cooperative Extension, University of California, 1994 Pub #21490

Rice Production in California. Cooperative Extension, University of California, 1992 Pub #21498

Integrated Pest Management for Rice. Second Edition, University of California, Statewide IPM project, 1993 Pub # 3280

Engineering Standards and Specifications for

Closed Rice Water Management Systems

California Rice Water Quality Demonstration Project

U.S. Natural Resources Conservation Service

in cooperation with
University of California, Cooperative Extension
and the
Consolidated Farm Services Agency

Closed Rice Water Management Systems

DEFINITION

A closed rice water mangement system is defined as a planned system of level basins or checks in which all necessary structures have been installed for the efficient distribution of irrigation water and containment of rice pesticides.

The standards and specifications described herein refer to the following systems;

Recirculating (tail water recovery) - A flow-through system where water is applied to the upper basin and allowed to flow over weirs through a series of lower basins to a collection point where it is pumped back to an upper level basin or supply ditch for reuse.

Static (Pearson) - A system where water is independently delivered to each basin within a field via a ditch or pipeline usually along one side of the field. Water enters each basin through flap-gated inlet pipes or other antibackflow devices which keep pesticide treated field water within the basin and out of public waterways.

Selection of a specific irrigation water management system is dependent on soil type, slope, aspect (wind direction), and water delivery. No less important is the ability to hold irrigation water for the prescribed period of time necessary for the effective dissipation of pesticides. The following standards and specifications are intended to give the producer a working knowledge of system design and function. Natural Resources Conservation Service should be consulted prior to actual design work or implementation.

DESIGN CRITERIA

All closed rice water management systems described herein are designed to contain pesticide treated water within the system for the required holding period. All drainage outlet gates and structures that can discharge water are designed such that they can be sealed during the holding period.

STANDARDS

Land Grading

- Rice only - 0.02 to 0.05 feet per 100
- Rice-row crop rotation 0.05 to 0.2 feet per 100
- Basin elevation difference not > 0.3 feet

Basin size

- Determined by maximum difference in water depth and wind.
- Where wind is a factor levees shall be closely spaced and if possible at 90 degrees to the prevailing winds. Maximum basin size is recommended at 20 acres.

Drainage

- Provisions to drain must be developed.
- Basins to be drained in a single direction no longer than 660 feet.
- Supply ditch or pipeline can serve as the drainage outlet when water control structures can be held open.
- Drainage structures shall be capable of draining basin in less than 3 days.

Dikes (Levees)

- Mineral soil only (plant residues and organic matter create seepage problems).
- Basin levees where the maximum vertical interval between checks is < 0.5 feet - minimum top width = 2 feet.
- Minimum settled height is the depth of ponding plus 0.5 feet with side slopes of 1.5 horizontal to 1 vertical.

Field perimeter dikes (levees)

- Minimum top width of 13 feet, where access is needed, 4 feet without access. Minimum height = ponding depth + 1.24 feet.
- Minimum side slope of 2 horizontal to 1 vertical constructed,
- Where dikes constitute boundaries of downslope fields, and
- Where vertical intervals between basins exceed 4 feet from top to bottom basin.

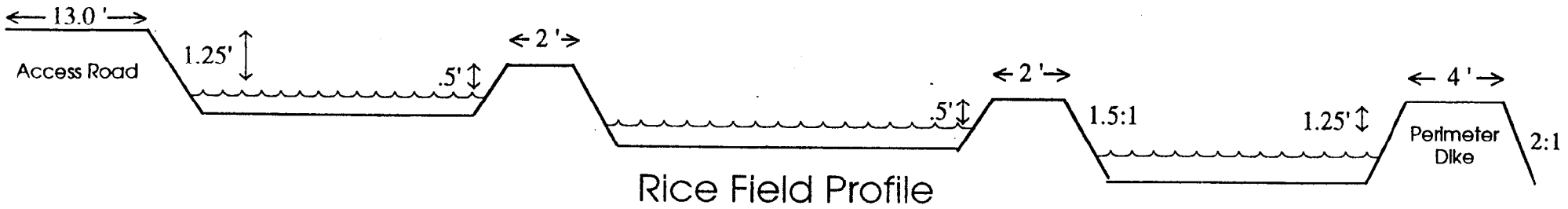
Water Control Structures

Flash board weirs, float control valves, other. Capacity adequate to meet the following:

- Irrigation flow - providing a continuous flooding depth of 4 to 6 inches during stand establishment.
- Field Drainage - to drain the basin within 10 days.
- Storm runoff - capable of draining the runoff produced by a 10-year 24 hour storm within 2 to 3 days (1.7").

SYSTEM DESCRIPTION WATER SUPPLY

Recirculating (tail water recovery) Systems are used with flow-through basins connected in series, where the water depth is controlled by rice boxes or other weirs placed in the levees. A storage sump or ditch is used to provide a buffer for tailwater due to variations in evapotranspira-



Rice Field Profile

APPENDIX C

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION
Environmental Hazards Assessment Program (EHAP)

Laboratory Project Plan and Protocol for the 1997 Rice Pesticides Monitoring Program
Study #181
February 1999

Organization and Responsibility

Kevin Bennett is assigned EHAP laboratory liaison for the Department of Pesticide Regulation. His duties include: Reviews laboratory QA/QC plans and QA reports; meets or communicates with field sampling consultant and sample custodian to evaluate progress and resolves problems; submits QA reports to KayLynn Newhart.

KayLynn Newhart is the agency contact person and project leader for the rice pesticide monitoring program for the Department of Pesticide Regulation. Her duties include the overall responsibility of agency communications and project changes concerning this monitoring project.

All laboratories should report all analytical data and information to KayLynn Newhart.

Protocol

The monitoring program shall follow the approved written EHAP protocol (Appendix 2). Changes to the protocol must be approved by the EHAP.

Quality Assurance Objectives

Each laboratory will use their method detection limit (MDL), instrument detection limit (IDL) and a reporting limit (RL) for each analyte as documented in their approved 1995 analytical method.

Method Validation

The mean and standard deviation (s) values from the 1995 method validation study will be used to set warning and control limits at +\-2s and +\-3s, respectively. **Each laboratory will be required to notify the EHAP laboratory liaison of any changes or procedures made to the 1995 analytical method before analyzing any field samples.**

Continuing Quality Control

Accuracy is defined as a determination of how close the measurement is to the true value and is often described as percent recovery. Accuracy is to be expressed as Percent Recovery (%). All calculated values for accuracy shall be presented with the analytical results. The equation for calculating Percent Recovery is as follows:

$$\text{Percent Recovery (\%)} = \frac{\text{sample concentration}}{\text{matrix spike concentration}} \times 100$$

Accuracy will be assessed by requiring each laboratory to analyze **two** matrix spike samples per analyte for each extraction set of up to twelve field samples (Appendix 1).

Accuracy control charts will be plotted by EHAP for each chemical and method and for each control sample matrix. The warning and control limits are established as listed in the method validation section. If any continuing quality control spike recovery is not within the limits of these criteria, the following is required:

1. A check shall be made to be sure there are no errors in calculations, surrogate solutions, and internal standards. A check shall also be made on instrument performance.

2. All affected data shall be recalculated and/or the extract shall be reanalyzed if any of the above checks reveals a problem.

3. All affected samples shall be re-extracted and reanalyzed if none of the above is identified as a problem.

4. All analytical data shall be flagged as "suspect" if the accuracy still does not fall within the limits of the above criteria. The laboratory QA officer shall notify the EHAP QA officer within one working day after discovery of "suspect" data.

5. If an unacceptable value cannot be corrected, additional samples may be analyzed to determine the validity of the original sample results.

The calibration curve should be prepared such that one standard is at the reporting limit and one is higher than the highest expected amount. If after initially shooting the sample extract the concentration of the analyte falls outside the calibration range, the sample should be diluted so it falls within the calibration range. **Each laboratory shall notify the EHAP laboratory liaison of any changes in their 1995 calibration procedures.** As an interlaboratory quality control check a minimum of ten percent of the total samples collected may be analyzed by a second laboratory for verification. CDFA laboratory will analyze split samples for molinate, thiobencarb and carbofuran.

In addition, 3 rinse blank samples will be collected from CBD5 during weeks 3 and 6 to check

for potential field contamination. Blind matrix samples will be routinely submitted to each laboratory to check for accuracy.

Background surface water will be provided by EHAP to the laboratories and used for control and fortification samples.

Backup field samples collected and stored during the study may be analyzed if sample breakage occurs or if sample results between the primary and quality control laboratories are dissimilar.

Audits of the field sampling and lab analysis may be conducted.

Reporting

Results of field sample and continuing quality control analyses shall be reported to the EHAP laboratory liaison within **21 days of the date samples are received at each laboratory**. Each laboratory shall submit legible, organized reports which contain analytical results of all samples received from EHAP. Analytical results are to be expressed as ug/L to three significant figures for all samples. Positive matrix blank results shall be reported. Do not correct field sample results for background levels. Indicate if the results have been adjusted for spike recoveries. **Each laboratory shall notify the EHAP laboratory liaison of any changes in their 1995 procedures for reporting sample results including number rounding procedures.** The report shall evaluate the quality of the individual sample data, based on the method validation analyses. The reports shall include the following:

1. Chain of custody (COC) forms; all analytical results are to be reported on the COC, including the name of the person extracting and analyzing the sample, date of extraction and the date of analysis for each sample.

2. Records of any quality assurance problems and questions pertaining to the samples analyzed.

3. Calculations of accuracy.

4. Reporting Limit (RL); for those samples that contain no detectable amount, write "ND" and indicate the RL.

5. Case narrative, if the data requires it.

In addition, the laboratory shall be prepared to provide to the EHAP lab liaison all sample custody paperwork, records of times and dates of analyses, and raw data pertaining to both the analyses and the quality control checks within 10 working days after the information is requested.

Archives

All backup samples and sample extracts shall be stored frozen or refrigerated until EHAP authorizes their disposal.

All raw data, including chromatograms, memoranda, notes, worksheets, and calculations that are necessary for the reconstruction and evaluation of the study shall be archived at each respective laboratory for at least three years.

APPENDIX D